GAS JOURNAL

LIGHT ♦ HEAT ♦ POWER ♦ BYE-PRODUCTS

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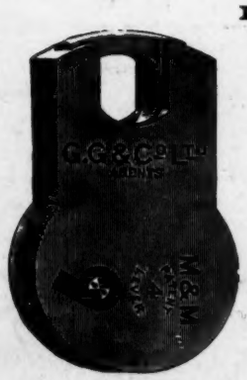

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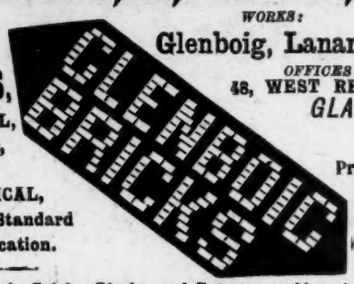

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EDITORIAL NOTES.

The Gas Industry and Economy Promotion.

FRESH work and interests in the gas industry burst forth in many directions. The movement has been of a prolific and promising character of late; and all that is new has a title to credit for having some bearing on the general progress. The extraction of benzol from gas is a war-time necessity; but we are looking to it as a future source of profit, and so a contributor to the production of lower gas prices, which, in turn, will promote the use of gas—valuable in both domestic and industrial economy—for heating purposes, as well as help to protect the lighting business. Tar dehydration is a favoured process. Through it better control should be kept over the prices obtained by the industry for the light oil content; and local economy should be served by the availability of refined tar for road purposes. There, again, there should be a contribution to the objective of cheaper gas. Fuel economy is a live subject of the day, which has appealed to the Government with such force that it has been taken under its wing. Gas coke—well produced, and not too "rich" in moisture and ash—should stand to profit from the fuel-economy investigations. The growing use of coke for steam-raising in factories and electric generating stations and for motor traction should furnish to the Board of Fuel Research data which should promote benefit for both the coke producers and gas consumers. Increased attention, too, is being paid to economies in gas-works practices. But withal—with economies and with promising developments—the beneficent work of the gas industry for communities and industries has the opposing forces against it, in the latter normal times, let alone under the malefic conditions of the present, of high prices of raw and structural and manufactured materials and higher rates. If consolation there be in the reflection, it may be said that those running competing industries are subjected to very similar conditions.

Such considerations will arise in the minds of those who give to the Presidential Address of Mr. W. Whatmough to the Manchester District Institution of Gas Engineers the careful perusal to which it is entitled. War influences thread themselves through the composition; but truly, diverting the thoughts momentarily from the horrors of the war and all that it means to us individually and collectively, the gas industry is indebted to it for its revelation and stimulation. But for it, we might have pursued the old roads and never have seen the new, covered as their entrances were by the traditional growths of years. But as to the forces which are the drags upon the maximum progress of the industry to greater service, we cannot hope much for a reduction of the prices of materials until we get to some definite settlement of industrial conditions on peace lines, and the then governing circumstances help to bring the prices to levels more conformable with past experience and hopes as to the future. But as to coal, the present difficulties do not give much room to consideration as to what will be its position after the war. In the gas industry we are at all events—Mr. Whatmough points to these things—hoping for good immediate results from the Government control of the coal mines during the war, and the establishment of a department, with a Controller at its head, to administer the work associated with the coal supply of the country.

The anticipated results are twofold. There is the Price of Coal (Limitation) Act, the spirit of which has been roundly violated in various coal-owning quarters. The Government control of coal must bring about a due observance of the Act, or else purchasers will want to know the reason why. Government control, it is also understood, means preferential provision of coal to essential industries—industries essential to the promotion of the interests of the Allies in the war and in serving the community. But there must not be any undue reliance upon this. Self-help must precede and accompany Government assistance. We are at war; and the war has taught us that large margins are a protection. Mr. Whatmough believes in a large margin in current circumstances. In his opinion, the purchasing of materials to carry-on will become more difficult should the war be prolonged for a lengthy period, and "to have goods in possession equal to a twelve months' supply is desirable." That is a big order. If it errs, it is on the side of lavishness, even in war time. It may make some of those feel the absurdity of their position who have stuck out for the old percentages of monthly coal deliveries in both the summer and winter, despite traffic disabilities, instead of equal monthly deliveries, so as to relieve winter traffic. The recent experience of Polar conditions, of 25 to 50 p.ct. increases in the demand for gas, and of the prices that had to be paid for spot parcels of coal through the running out of works' stocks, will no doubt have induced broader views as to stocks in times such as these, with transport muddled by war conditions and shortage of the means of conveyance, both on sea and land. As to the future, there is no desire to witness nationalization of the coal supply; but we should not be at all sorry to see the Price of Coal (Limitation) Act and Government control result in some subsequent regulation of the coal industry, whereby (say) dividends and wages should take an upward course as the price of coal took a downward one—somewhat after the manner of gas prices and dividends and co-partnership. The gas industry, and no doubt many others, would be thankful for the security that this would afford.

In addition to materials, rates have been mentioned as one of the outgoings incidental to business which have become permanently higher. This cannot be avoided; but whatever is possible should be done to check the upward tendency. The "whatever possible" can be very little so far as gas undertakings are concerned; but what they can do is to "peg away" at getting valuation methods soundly and more firmly based, so as to eliminate the large diversity which results (as Mr. Whatmough illustrates, and as has been done by others) in the charges for rates per 1000 c.ft. of gas sold, which, for example, causes Heywood to pay in rates 1·27d. per 1000 c.ft. more than the average of twenty-one gas undertakings.

But conditions hostile to progress make all the more necessary the realization of economy and benefit from every possible quarter—on the works and elsewhere. Mr. Whatmough shows the advantage he has secured by the adoption of continuous verticals over horizontals that—be it marked!—were hand-charged. There should at no time be any difficulty in showing advantage over hand-worked retorts. But this is an extraordinarily bad period for making comparisons between new and old plant, with the prevailing heavier expenses coming from every direction up-against the working of the former. The central feature of what Mr. Whatmough shows in this connection is that during the war he has been putting gas into the holder with his vertical settings (the hand-worked horizontals assisting at the peak load) at an average increase of only 0·74d. per 1000 c.ft. on his average cost in 1911-13, despite the net cost of coal being 2·31d. more per 1000 c.ft. of gas made. Savings have come from labour (notwithstanding the higher wages), maintenance, and purification, totalling to 2·29d. More gas,

too, has been made per ton of somewhat inferior coal; so that, in the total, considerable financial benefit has accrued, which has been of advantage in war times, and will be as it then accrues of still greater advantage in peace times. The address shows the saving of man power produced by the substitution of verticals for hand-stoked horizontals, although there has not been in this regard all secured that other works have succeeded in accomplishing. But Mr. Whatmough only requires twelve men for his maximum output with the vertical system, as compared with 27 men with the old plant. The more that can be done in economizing the man power of the country, the better; for if the trade-after-the-war aspirations are going to materialize, every particle of the man power of the country will then be needed.

As to fuel economy and the development of the use of gaseous fuel. It is not for a moment supposed that a lower calorific value gas than is supplied under present conditions is likely to become a general thing for some distance ahead, even though—given appropriate manufacturing and distributing plant and gas-consuming apparatus—economy for the consumer could be shown. Therefore, Mr. Whatmough advocates the treatment of the gas-fire business on the same lines as the industrial business. This can hardly be, seeing that the former business comes as part of the winter demand only, while the industrial supply is an all-the-year-round one. Low gas prices for heating in the recent cold weather would not have been a very profitable matter for many gas undertakings. One point in favour of differential prices for gas-fire purposes is that they do not entail in these days of discount meters separate piping and meters. What, however, we have to work for is to get the price of gas down generally to a lower figure, inasmuch as there is no reason why gas-fires should have gas cheaper than cookers, or water-heaters, or any other daily use that applies the whole year through. Another line in development is the use of coke for steam traction purposes and industrial steam raising. The coke from the vertical retorts seems to be very much approved at Heywood for these purposes; and some excellent experiences are related by Mr. Whatmough. But later on he, under the special circumstances of his case, shows that horse and cart traction was found better for the purposes of his works than motor traction; and he indicates that it was cheaper. But he gives no details of costs per ton, so that others might compare with their actual experience with motors. Some works have adopted quite imposing fleets of motors; and their efficiency in quick delivery and in distributing range is a consideration apart from the bare costs per ton, which costs naturally vary with the compactness or otherwise of the district. A factor in choice is example; and where steam traction can be applied to gas-works purposes it should be for the sake of the coke trade. Another economy to which eyes are being turned is that of co-operative tar distillation. Mr. Whatmough is of opinion that the solution of the problem is in the direction of small works selling on an approved sliding-scale to larger gas undertakings where tar distillation is already in operation. It does not matter much which way it is done, providing the more profitable is adopted according to local conditions. Certainly a stand ought to be made at once against loss of money on long-distance tar transport, and against unreasonable treatment by certain tar distillers, who have ruled the market, considerably more to their own advantage than to that of the producers.

Much else appears in this interesting address, which will be read, as it was heard on Saturday, with both pleasure and profit, for it pictures a state of things which shows an industry with excellent opportunities for new activities—all subscribing to a larger prosperity and usefulness.

The Accuser and his Plans.

It is time that the irrepressible Prof. H. E. Armstrong left pedantic generalizations and came down to solid particulars in the matter of his accusations against the fundamental lines of gas manufacture, as followed by men with life-long training and experience in the technical and commercial work of the gas industry. In print and in speech up and down the country, he has traduced technical gas men and their practices; his last two essays in this line being at the recent meetings of the South Metropolitan and the South Suburban Gas Companies. Some people are of opinion that there is little use in taking notice of academic dogmatism that sets itself against universal practice by mere commonplace assertions and vituperation, unsupported by anything more material. And up to a point we agree; but Prof. Armstrong has evidently persuaded himself that he knows the way of salvation for the gas industry, and that if it does not follow his way it is doomed. Therefore, we here and now invite the Professor to get away from hollow generalization, and to produce first his evidence that the manufacturing modes of the industry are wrong (supported by a financial illustration), and, secondly, a concrete scheme (also supported by financial illustration) of low-temperature carbonization, *plus* the gasification of the coke in producers, as this is the line of development that he advocates. Of this Prof. Armstrong may be well assured, that if he will show what he has of a solid nature behind all the general statement to which he has given expression by voice or pen, it will receive careful investigation at the hands of men who have spent their whole lives in the technical and commercial work of the industry. This was promised by Mr. Charles Carpenter, D.Sc., at the meeting of the South Metropolitan Gas Company, and by Mr. Charles Hunt, at the meeting of the South Suburban Company; and our columns are open to Prof. Armstrong to present a case, with body in it, in support of his accusations and prophecies.

In the first place, the whole fabric of his contentions depends on the legislative interdiction of the use of raw coal. The people must be compelled to use the coke obtained by low-temperature carbonization; and the statutes governing the gas industry must be abrogated and replaced by a vast liberty. This means revolution; and this the gas industry (though the process would have to be a gradual one) would not avoid if Prof. Armstrong has an unanswerable case, destructive from the economic standpoint of present procedure and constructive from the same standpoint to the general advantage. Then, in the second place, to do what Prof. Armstrong suggests would necessitate an immense speculative capital expenditure on low-temperature carbonizing plant, and coal and coke handling equipment, from the former of which less result would be realized per ton of coal than under the present system, which includes in many works the gasifying of the coke, with or without carburetting the product. All the plant on the gas-works would have to be developed to fresh proportions to deal with the new conditions. The storage capacity especially would have to be of mammoth dimensions to deal with the coal and coke, and for safety's sake. The gas-holders would need revision in dimensions and number to deal with the gas from the low-temperature retort plant, the low-grade gas from the producer plant, and then the mixed lower grade gas than is at present supplied. The distributing plant, too, would have to be made to conform to the new conditions; pressures, too, would have to be considerably increased; every service-pipe would have to be governed; and the gas appliances of the consumers would have to be brought into harmony with the new gas supply.

Scrapping and destruction of present capital would have to be on a gigantic scale, and the new capital required on lines describable only by the same adjective. We ask Prof. Armstrong to show us what, for the supply of a given district, all this capital destruction and new capital means, and how it stands in the financial balance as between his proposals and the actual present practices of the coal gas industry. There is also the question of labour. This, again, would, of course, have to be considerably increased. There is the question, too—it is an important one with the immense additional sources of supply of like secondary products, and the development of processes for the extraction of nitrogen from the air, and the production of synthetic fertilizers—as to the future of the secondary products markets, and its bearing upon the economic situation of the coal-carbonizing industries. All these things Prof. Armstrong possibly has studied; and he can, no doubt, foretell much of which the lower intelligence of the gas industry would like to be informed. It must be so; his robust assertiveness, and his optimism as to the security that there is for the gas industry in his plans, are the guarantees. So we invite the Professor to give us a concrete scheme on a defined basis, showing what his ideas actually mean in plant, labour, capital costs, and general financial effects, by the conversion of the operations of a gas undertaking from the present lines to those which he has hitherto advocated with an assurance born of ——What?

We will not deal with Prof. Armstrong's attacks upon the Boards of the two South London Companies. If his knowledge of the technical and commercial requirements of the gas industry is equalled by his knowledge (at the time he was speaking) of the composition of these two Boards, and

of what is required in the composition of the directorate of a technical-commercial undertaking, then we can promise him that his compliance with our request will yield him a magnificent reward of interest throughout the coal carbonizing industries—especially that providing the gas supply to our cities and towns.

Board of Fuel Research.

The use-as-you-please fuel methods of this country are to undergo serious investigation under the authority of the Government, and not before it was due. It is a direction in which the promotion of economy means material value, the existence of which cannot fail to appeal to a Government carrying a prodigious financial burden, such as has been created by the war, and which must inevitably reach larger proportions. When people speak of fuel economy, they generally look at the matter from the point of view that scientific methods of utilizing coal would result in the saving of so many million tons of coal a year—in the present state of knowledge alone, the estimate of one learned authority is 50 million tons—and that this tremendous quantity, calculated out at the market price of the day, would represent so much in solid cash. But "fuel economy" signifies much more than this. Fuel economy is something of both national and industrial import. In every industrial undertaking, fuel saved means money earned; it also means a saving in the cost of manufacture, which is of advantage both to the producer and to the buyer. In the use of coal, too, there is by one means destruction and waste, and by another the rescuing of all possible value from the coal, and the supplying of the materials essential to the life of several important industries. "Fuel economy" is a term that covers much, and has numerous ramifications. We can trace the beginning of its effects with assurance and certainty; but they spread and spread from these beginnings to such a degree that we cannot possibly trace or define their limitations.

In these circumstances, the proper use of fuel is a question that enters largely into our national economics and prosperity; and thus it is a proper one for the Government to take under its wing, and not leave to bodies of less influence and authority to voluntarily pursue with (because of the want of authority) a much inferior chance of doing effective work. Welcome is therefore given to the Board of Fuel Research, which has been appointed on the recommendation of the Advisory Council of the Committee of the Privy Council for Scientific and Industrial Research. A hint was given some time ago as to the prospect of some such appointment as this being made; and now that it is an accomplished fact, the gas industry—as one of the large coal-using industries, and as the only gaseous and smokeless solid fuel supplying industry in the country—has every reason to be satisfied not only with the contemplated work, but with the composition of the Board. Sir George Beilby, F.R.S., consents to act as Director of the new organization. The gas industry knows Sir George for his many distinguished qualities and attainments, the latter not unassociated with its own work. As coadjutors, he will have the Hon. Sir Charles Parsons, Mr. Richard Threlfall, F.R.S., and Sir Richard Redmayne, K.C.B., His Majesty's Chief Inspector of Mines; while Prof. W. A. Bone, F.R.S., is to be consultant to the Board, but the duties will not necessitate the relinquishing of his chair at the Imperial College of Science and Technology. This is an excellent and strong combination, from which much may be expected with the Government behind it. In fact, we regard this as the best potential piece of work the Committee of the Privy Council for Scientific and Industrial Research has so far taken in hand; and we so regard it because the proposed work is fundamental to so much else.

The functions of the new Board (its title indicates) will be largely of the research order—research both in the laboratory and on the working scale, with the view of discovering where uneconomy exists, where economy can be promoted, and where the country and industry can profit by more scientific utilization of fuel or a change in fuel. The Board are taking over the work of the Fuel Economy Committee of the British Association, of which Prof. Bone was Chairman; and the information so far collected by, and the plans of, the Committee will be available for the guidance of the Board. In other directions, too, work has commenced; and the Board will make it their business to attempt to co-ordinate it all as far as possible, for economy must accompany efficiency in research to realize the maximum result in fuel saving. There is an abundant field for research. The British Association Committee have found this; and the Sub-Committee on Coal Conservation appointed by the Reconstruction Committee of the late Government left a legacy in the shape of several suggestions for exploration. The gas industry could submit a few suggestions from its large accumulation of experience. It is also thought that part of the activities of the Admiralty and the Ministry of Munitions could be associated with those of the new Board. However, whatever the eventual field of the Board's operations, its area will be extensive; and, whatever the results, they should be beneficial to an industry whose primary work is the separating of coal into its main constituents, and bringing them into a condition for use directly or indirectly for, in some instances, both domestic and industrial purposes, and in others for industrial service only.

Tar Dehydration and Oil-Washing.

It was a sparkling little paper that Mr. A. E. Mottram, of Ossett, read before the Manchester Institution on Saturday. It was headed "Description of a Tar Dehydrating "and Debenzolizing Plant." There was little "description" in it, but a large number of subtle passages intended to provoke discussion on all sorts of subjects attaching to both operations. There was a "tone" about the paper that we like. Though difficulties have been met with, patriotism and duty ride supreme. This is as things should be. After patriotism, the author sees in the new work a good commercial proposition. The fact that at the outbreak of war, word was received from the tar contractors that the contract was broken, and that they could not guarantee to remove the tar, together with the low price that was being obtained for it, led to the installation of a Wilton tar-dehydrating plant. The author remarks: "We have not regretted it." Significant as to the future are these words, taken in conjunction with the preceding ones, as to a low price having been previously obtained for tar, supplemented by the later statement that the worked-up tar has been disposed of at satisfactory prices, and over 30 gallons of light oils (which is a very good average) have been sold per ton of tar. Mr. Mottram does not say in the paper what prices he actually realizes; but his experience, it is manifest from the cheerful manner in which he speaks of it, is of an order that puts into the shade current quotations for crude tar. That is the experience elsewhere; and the tar distillers (who have had a fruitful time in the past) can hardly look upon the existing aspect of things in any joyful spirit. The long and the short of the matter is that tar dehydration has come to stay, and will extend. Although saying this, there is, as Mr. Mottram observes, plenty of work in connection with tar for both the chemical manufacturers and the tar producers; but the latter are not now prepared to be satisfied with the slender revenue that their tar has hitherto produced.

Speaking of quantitative results, working comparisons as between one gas undertaking and another would be much facilitated if authors would not treat tar as if it was all of the same constitution, but would state the coal used, the character of the carbonizing plant employed, and the temperatures, as they all have part in the quantity and quality of the tar made. If an analysis of the tar could also be supplied, so much the better. Another matter is that, though the author states that the working cost is small, and that one man looks after the plant at an expenditure of about 6d. per ton of tar, he does not mention the aggregate costs—whether or not (say) round about 6s. or 7s. per ton of tar is the figure. However, whatever the costs, there is, on the author's part, satisfaction with the revenue balance per ton of tar. An important advantage of a dehydration plant is that it promotes the disposal of tar locally, and so saves carriage. The tar market generally would be much improved if all gas undertakings followed Mr. Mottram's example, and endeavoured to sell all their tar in their own areas.

The same plant is employed for debenzolizing washing-oil—one day out of three; and there is no reference to any difficulty affecting efficiency arising from its use for this purpose. There are several points here that are becoming old friends. The author considers there are obligations on those who have greater power than gas undertakings to assist them in keeping free from trouble, and in preventing the depreciation of the general revenue of the concern, owing to the adoption of the oil-washing process. There is the revival of the naphthalene nuisance; and there is diffi-

culty in getting washing creosote that does not contain an inconveniently high percentage of naphthalene. Mr. Mottram does not say what is the high percentage in his case—how much it is (say) above 5 to 7 p.ct., which appears to occasion very little trouble. However, a suggestion that he makes is that the Ministry of Munitions should help gas undertakings by seeing that there is procurable a good supply of creosote nearly free of naphthalene. The Ministry of Munitions have, of course, a large amount of work to do. But they have also power of an order not possessed by gas undertakings; and they are concerned in the realization of high efficiency in oil-washing, which sometimes suffers through the accumulation of trouble. Perhaps, therefore, they might do something to help in this connection.

The same Department will derive some additional interest from another suggestion in the paper. Not a few gas-works have been deprived of part of their ammonia production through turning over a member of the scrubbing plant to the work of benzol extraction. Ossett is troubled in this way; and it is a difficulty that confronts other undertakings, the managements of some of which are not like the one at Ossett in placing, under war necessity, the work of benzol extraction before the loss of ammonia, though this is far from being a negligible quantity. In such cases, the author thinks that, if the gas undertakings provided the distillation plant, it would be a fair thing for the Ministry of Munitions to provide the necessary washer, and then washing for benzol could be made compulsory. We will not argue as to the fairness or otherwise of the submission. It depends on circumstances. If the plant is going to be permanently used for benzol extraction—not only now, but after the war—then, if the Ministry of Munitions provided a washer now, it should be bought up at a fair valuation after the war. There is a matter in this association that presses; and upon this perhaps the Ministry of Munitions could bring their influence. A number of gas undertakings would have started oil-washing long before this, but that they have been unable to secure the necessary plant. It has been on order; but delay has succeeded delay, and some are still waiting. There is room here for a little speeding-up; and room, too, for an assurance from headquarters that the delays there have been in plant installation will henceforth be reduced within reasonable limits. It seems strange that, in such an essential matter, provision has not been made for the prompt supply of plant. All the blame for backwardness in entering upon the work of oil-washing must not, in view of this, be placed upon some gas undertakings. However, what is now wanted is that a greater number of undertakings should enrol themselves as willing to start oil-washing, directly the necessary arrangements can be made; and for them to regard the fulfilment of the obligation at the earliest possible moment as a matter to which they are in honour bound.

Protection for Municipal Gas Engineers.

In many cases, the position of the municipal gas engineer and manager is as congenial as that of the chief officer in company service; but there have been instances where engineers in local authority service have not been justly treated. The introduction, too, of Socialistic elements into local governing bodies has not tended to improve the comfort and enhance the efficiency of management. One sees, in consequence, whenever opportunity arises, municipal engineers passing over to company service; and this is not to the credit of municipal bodies. The occasional cases of injustice, which have brought about severance of engagements, induced Mr. W. Whatmough, in his Presidential Address to the Manchester Institution last Saturday, to make a suggestion with the view to giving increased stability to tenure of office. He thinks a scheme might be formulated whereby members of the Institution of Gas Engineers might receive help and protection where the necessity arose. This might take the shape of an independent tribunal, to whom reference of questions in dispute between gas engineers and local authorities in whose service they are, might be made with the view to justice being secured. In his opinion, the District Associations could first of all consider the cases as they arose in their respective areas, and submit the information to the Parliamentary or a Special Committee of the Institution, who would adjudicate upon them, and take such action as might be deemed necessary and proper.

Considerations Affecting the Proposal.

The first question that suggests itself is what would be the effect of such a reference, and what possible action could be taken under such a scheme by the Institution, who might not be recognized by the municipal authorities, and whose interference might be strongly resented by the authorities—so much so that any prolonged tenure of office might not be a desirable thing for the gas engineer, and so the good intention of Mr. Whatmough would be frustrated. He says that public opinion has a great influence with local authorities, and apparently this is the direction in which he conceives the Institution might apply a little leverage. Even so, the success of public opinion in favour of the engineer might only add additional thorns to the official seat. It is undeniable that there would be personal value in having the matters in dispute placed before the public in a correct light. But nothing effective could be done unless the body to which the gas engineer could make appeal was an impartial one and acceptable to the local authority in whose service he happened to be. No local authority would in such a matter regard the Institution of Gas Engineers as an impartial and independent body; and certainly they would not, without other influence was brought to bear, pay much heed to any result of an investigation by a Committee of that body in reference to disputes between one of their officials and themselves, without the tribunal also embraced in its composition men who were not gas engineers, but who represented municipal interests, or unless the agreement of service made reference to the Institution tribunal one of its conditions. But we should have our doubts as to any local authority agreeing to such a condition. Mr. Whatmough suggests that on the part of the local authority there should be no difficulty in obtaining a right of appeal to the Local Government Board. This would complicate matters; and it points to a joint tribunal being the only feasible solution—if anything of the kind be attempted. However, we doubt the acceptability of the proposal, unless it can be re-moulded to make of it a more effective piece of machinery.

District Association Mandates.

There is another suggestion. District Associations send representatives to the Council of the Institution of Gas Engineers. What for? To look after the interests of the district, and to use their personal judgment in giving votes on matters that come before the Council. They are plenipotentiaries of the first order. They are men who may have their predilections and bias in regard to many matters. As representatives of a district, they ought to vote for the considered and general views of the district, though nothing could, of course, prevent them from voicing their own opinions. Under the present system, however, they have no instructions; they simply attend the Council meetings, and, as representatives of a considerable number of men, voice and vote as their individual inclination directs. Mr. Whatmough desires reform in this matter. When possible, on important subjects, he suggests that a district representative should have an opportunity of conferring with the members of his own District Association, and go armed to the Council meetings at which such questions are to be discussed with a majority instruction as to which way the district vote is to be registered. At the present time, there is not even a report made to the Associations as to what their representatives have been doing, or how they have voted on questions of importance to the industry or profession. This is certainly a matter which might be taken into consideration by the District Associations to ascertain whether it is not time that some change was made in the suggested direction. It may be said that the present system has worked very well in the past. It may in reply be pointed out that the past is not the present or the future; and that several momentous subjects have raised, and are raising, themselves which will largely affect the interests of the industry, and must be considered by the Council of the Institution. Of course, matters arise that have to be dealt with summarily; and then the only thing to be done is to leave the matter of voting to the discretion of the district representative. Mandates from the Associations to representatives as to how to act would raise a more general interest in the doings of the Council of the Institution, and would perhaps infuse into its work a greater visible enthusiasm.

Germany Misses English Gas Coal.

The Berlin gas-works are sadly missing their quondam supplies of English coal. We gather this from an article, on "Gas-

Works in War Time," by Mr. E. Korting (who is well known to British gas engineers). A translation of the first part of the article appears in other columns. We have had previous glimpses of how German gas-works have fared during the war, but this one, which is given by a highly-trained and observant gas engineer, at the very top of the German gas profession, is of marked interest. It is easy to see that those in charge of the Berlin works of the (before the Government took them under their care) Imperial Continental Gas Association, have in the course of the war felt regret that results and official comfort are not what they were in the times of working with English gas coal. There have been large fluctuations in the supply of coal since war broke out; and the varieties of German and Belgian coal that could be obtained have caused anxiety on account of inferior quality for gas-making purposes, though prices varying between 26s. and 30s. 6d. per ton have had to be paid for it, compared with 15s. 3d. for English coal delivered in November, 1912. The inferior quality coal affected the production of gas and the quantity and quality of coke and other products, including benzol; and it has not (as explained by Mr. Korting) conduced to the good working of the vertical and inclined retorts. The coke has given much trouble in the producers; and the retort gas producing capacity, using a lower grade coal (combined with the debenzolizing of the gas), has been reduced. Consequently more retorts have had to be put under fire. All this points to the troubles of German gas engineers who were formerly blessed with English gas coal having been greater than those of their British compeers working with their native produce. Their troubles have been chiefly due to transport.

The Value of the Old Hand.

Another point in the article which is of special interest just now, when fit men within military age have other occupations than their wonted ones, is the appreciated value of the old gas hand beyond military age. We have seen that German engineers have had, through the inferior quality of their coal, to bring into use more retorts, and in some cases these are of the old horizontal type, hand charged, which have only been kept in existence as stand-bys, and have not been worked for years. At home there have been some of these retorts that have had long rest brought into service during the frigid weather of last month; and no doubt here, as in Germany, the gas engineers have found that modern carbonizing plant has dulled the skill of even the old hands at wielding the shovel. Besides, many men now working on the modern plant have had no acquaintance at all with shovel charging. But with the importation of new men into retort-house operations, and the necessity for having recourse to old stand-by plant, "old boys" who were once accustomed to the shovel have been invaluable. Mr. Korting, however, could not get enough of these, and so had to hurriedly extend his vertical retort plant. With time, and the disappearance of the old hands who worked by shovel, horizontal retorts requiring manual power will become next to useless for stand-by purposes.

Decision in the South Suburban Company's Application under the Calorific Power Act.

With reference to the application of the South Suburban Gas Company for an Order under the Gas (Standard of Calorific Power) Act, substituting a calorific standard of 475 B.Th.U. gross for the illuminating standard prescribed in respect of a portion of the Company's limits of supply, Mr. Garnham Roper has communicated the decision of the Board of Trade to the Company. He says the Board have carefully considered the arguments and evidence put before them at the inquiry held on Feb. 6, and the suggestion of the Company that the proposed Order should be in force only until the end of the first session of Parliament available for private legislation after the termination of the war. Having regard to the peculiar circumstances of the case, the Board are of opinion that the matter is one which should be left to the decision of Parliament; and, while they fully recognize the valuable services rendered by the Company in the supply of benzol and toluol for munition purposes, the Board feel that they would not be justified in exercising their powers under the Act for the purpose of making the Order that was asked for by the Company.

The annual general meeting of the Society of British Gas Industries will be held at the Trocadero Restaurant, Piccadilly Circus, W., on Tuesday, the 17th prox. The Council have unanimously decided that, in the present circumstances, it is advisable not to have the usual dinner this year.

PERSONAL.

Mr. WALTER MASON is to succeed his father, the late Mr. James Mason, as Manager to the Oakham Gas Company.

The "Court Circular" announced last Saturday that among those who had the honour of being received by the King, when His Majesty invested them with the Insignia of the respective Divisions of the Orders into which they have been admitted, were Mr. ARTHUR DUCKHAM and Mr. STEPHENSON KENT, who were Knighted.

Mr. JAMES BELL, Manager of the Kirkintilloch Gas-Works, has accepted the appointment of Gas Manager at Dumbarton, offered him by the Town Council. Mr. Bell, who is 38 years of age, started work with his father at Blairgowrie. He was then engaged at the Portobello Gas-Works, and latterly transferred to Edinburgh. For eight years he was Assistant Gas Manager at Airdrie; and he has been Manager at Kirkintilloch for a similar period. There is some opposition in Dumbarton to the dismissal of the late Gas Manager, as recorded in the "JOURNAL" a fortnight ago [p. 369].

The retirement of Mr. J. F. BRAIDWOOD from the engineership of the Greenwich Gas-Works was referred to by the Chairman at the recent half-yearly meeting of the South Metropolitan Gas Company [*ante*, p. 360]. The matter is mentioned in the March issue of the Company's "Co-Partnership Journal" as being "of more than usual interest, not merely because it is the end of forty-seven years of faithful and efficient service for the Company, but chiefly because of the cordial relations which so evidently existed between himself and his subordinates. The men at Thames Street always seemed to resemble a happy family, under the affectionate rule of a devoted father. Probably the Thames Street men were not free from faults; and it may be that Mr. Braidwood has told them so. But he rarely, if ever, admitted it to outsiders; and it needed some courage to suggest to him that one of his men was not all that he ought to be. Among the things which will be missing when the war is over will be the old condition of things at Thames Street; and we shall be grateful if the future has in store any adequate compensation for the loss."

OBITUARY.

On Friday, at St. Leonards, the death occurred of Mr. JAMES FORREST, for many years the Secretary, and subsequently Hon. Secretary, of the Institution of Civil Engineers. Mr. Forrest was born in 1825.

The death is announced, as having taken place at Melbourne Hall, near York, of Mr. WALTER CLIFF. He formerly resided at Wortley, near Leeds; being a member of a family which has long been associated with the commercial life of Leeds and the district. Along with his brothers he was formerly a proprietor of the business of Messrs. Joseph Cliff and Sons, fire-brick makers, of Wortley; and he and his brothers also owned the extensive works of the Frodingham Iron and Steel Company, in Lincolnshire (of which he was a Director). His personal work was mainly directed to its business and that of the Micklefield Coal and Lime Company, of which he retained the active management.

The Gas Light and Coke Company's Increase in Price.

A notice is being issued to consumers in the northern district of the Gas Light and Coke Company stating that the Directors much regret that, in consequence of the greatly increased cost of labour, freights, coal, oil, and every class of material employed in connection with gas making and distribution, they are compelled to increase the price of gas in the Company's district North of the Thames from 3s. to 3s. 4d. per 1000 c.ft., as from the next reading of the meters. This increase in price (which it is pointed out does not even approach in proportion the extra costs above referred to) will, in accordance with the sliding-scale provisions in the Company's Acts, be accompanied by a further substantial decrease in the rate of dividend to be distributed to shareholders. The notification concludes: "The Directors will immediately reduce the price of gas when circumstances enable them to do so."

A Priority Department of the Ministry of Munitions.

The Minister of Munitions has appointed Mr. Edgar Jones, M.P., as Controller of the Priority Department. A new Priority Advisory Committee, under the chairmanship of Mr. J. Wormald, consisting of Mr. Kenneth Chance, Mr. Alexander Walker, and Mr. Henry Woodall, has been elected to advise the Controller and the Minister as to the effect of any restrictive Orders of the Ministry of Munitions upon trade, with the view to causing the minimum of hardship. Mr. Henry Woodall needs no introduction to the gas industry, nor does Mr. Kenneth Chance, who has taken, among other things, a very live interest in the question of the recovery of cyanogen on gas-works. It may be remembered that he joined in the discussion on Mr. A. E. Broadberry's paper, on "A Simple Process for the Recovery of Cyanogen," read before the Eastern Counties Gas Managers' Association in 1912.

THE GAS INDUSTRY AND WAR FINANCE.

While the last issue of the "Journal" was going to press, the statement was being made in Parliament that the new money subscribed to the War Loan (including Treasury Bill conversions) was £1,000,312,950—a total which, even after the closing of the lists, many financial people regarded as impossible of having been attained. The fact is that there really can be no accurate standard whatever by which to gauge the likely proportions of an effort by the increasingly determined people of so powerful a nation as this. Instead of each effort as it is called forth proving (as would seem only natural) not quite so powerful as the preceding one, it turns out to be very much more so—until we have now the spectacle of one loan which absolutely dwarfs the whole National Debt as it existed before the war. How is this? Well, for one thing it is stated that on the present occasion the number of individual subscribers was no less than 5,289,000, as compared with a little over 1,000,000 in the case of the last loan in 1915.

More than half this huge total is a calculated figure applied to those who bought £19,300,000 War Savings Certificates during the period over which the loan lists remained open. Such a total shows how important a means are these certificates for helping the Government. The point cannot be too often emphasized that the War Savings Certificates are still procurable, and that the opportunity they present to the small investor is literally a golden one. Those who are in a position to do so should take every opportunity of increasing the popularity of these certificates, which, particularly through the medium of War Saving Associations, are admirably devised to encourage thrift. In connection with these Associations, books are now being issued, to which stamps representing sixpences saved weekly are attached towards purchases of certificates. By adding the new holders of these books obtained during the War Loan period, who will, the "Money Market Review" points out, swell the weekly subscription for certificates for many weeks to come, Mr. Bonar Law is able to claim another 2,711,000 investors, making a total during the War Loan five weeks of over 8,000,000.

Here are a few more gas companies' contributions to be mentioned this week—without distinguishing between new money and conversions:

Brighton and Hove General Gas Company, £10,000.
" " " to help employees to invest, £2000.
Farnworth and Kearsley Gas Company, £6200.
Felixstowe Gas Company, £475.
Hornsey Gas Company, £6000.
Watford Gas Company, £5000.
Wellington (Salop) Gas Company, £1550.
Winchester Water and Gas Company, £2000.
York Gas Company, £2500.

THE "COMB" WORKING IN THE GAS INDUSTRY.

The Case of the Fitters.

A drastic review of exempted men under the age of 31 is proceeding; and men above that age within the military age limits who have been exempted, but whose employment is open to any doubt as being of national importance, are also undergoing close scrutiny. The gas industry has, in common with other industries, to face the facts. The Government have pressed strongly on the tribunals, and also on applicants for exemption, that a critical stage has been reached in the war, and that it behoves every man to do his utmost so that the military authorities may have at their disposal the largest possible number of men at the earliest date. Before tribunals the military representative may raise the contention that it is not necessary to retain a man in civil employment even though in a certified occupation. But the burden of proof will still rest on the military representative. Therefore employers and men must be prepared with evidence to meet the contention if raised.

The process of combing-out appears to be now well under way in connection with gas undertakings; and the Ministry of Munitions may be warned that the central technical operations of gas supply in which they are deeply concerned stand a good chance of being injured by the far too solid depreciation of man power that is occurring in some instances at the commercial end of the business. An illustration of what is happening is seen in a report in another column (p. 475) as to an appeal by the military representative of Lewisham in respect of 57 employees of the South Suburban Gas Company, who had had their exemptions continued for three months by the Lewisham Local Tribunal. The occupations of the men ranged from clerical and showroom work, with prepayment meter collectors and gas-fitters in the middle, up to the chief of the Sales Department and the assistant to the Distribution Superintendent. In most cases, the Military Representative got his way; and the men will be called up—some at once, others in periods varying from a fortnight to two months. In yet other instances, the exemption was continued by the Appeal Tribunal for fixed periods, with leave to apply again. Employees engaged on clerical duties will be interested to learn the small importance that this Appeal Tribunal put on their work. In their view, such men are easily replaceable, and substitutes can make themselves efficient in their work in a very short time. It is clear, too, that the Tribunal consider special clerks and showroom men occupy inferior positions in point of skill to gas-fitters. Gas-fitters will be pleased—their work is described as being of "considerable importance." But the description has comparatively small confirmation in the decisions. The Company are to be deprived of a solid block of them. The fitters over 31 years of age are to have further exemption; and their cases are then to undergo another revision. But no less than twelve fitters of 31 years and under are to go; and only fourteen days are to pass before they are called up. Eight others who are mainly engaged on maintenance work are to give up their jobs to women. Again male slot-meter collectors are, according to the Appeal Tribunal, going out of fashion; this being work that can well be, and should be, done by women. It is quite probable that the war will bring about a large shuffling of occupation as between the two sexes; and that women will continue after the war to have a larger footing than before in the gas industry.

It will be seen from the report that within a fortnight the Company will lose sixteen fitters (including those on maintenance work) and within a month four others—20 fitters out of 38 whose cases were the subject of discussion before the Tribunal. These skilled men cannot be replaced; and therefore at the consuming end of the business, the Company being deprived of the work of these men, there must be some depreciation of service to present consumers, and less new business will be possible. This condition of things must, as already remarked, have ill-effect upon the economy of the work at the manufacturing end of the business, in the increase of the output of which the Ministry of Munitions as well as the Company are concerned. "Substitutes," even if they could be procured, cannot be trained in weeks or months to do work for which it has taken years to fully qualify the present fitters, and the characteristics of which work are ever becoming more diversified and complicated through the developments of the applications of gas. It is all very well to talk, as the Appeal Tribunal did, of "distributing" the remaining fitters. Gas undertakings would rather have their fitters, who are all skilled men, left to them than any other class of men in the gas sales department; for arrangements, in current circumstances, could be made for their services to be "distributed" in more ways than one. The position in respect of fitters is a serious one; and it will become more serious still. The man power of the gas industry has been very largely depleted already; and the industry has shown a robust loyalty in this and other respects. It has patched-up its organization as best possible by substituting unskilled and inexperienced labour; and now there should be the widest possible consideration paid to those parts of the remainder of the man organization that are the most effective in sustaining the efficiency of service to both the nation and the community. The fitters form a critical part in the organization. As to the clerical and showroom work, slot meter collections, and burner maintenance, these are services with which it is not so difficult to deal, though bad enough in some circumstances, one of which is (in respect of the two latter classes of work) the character of the locality. It is, however, clear that gas undertakings must, in their own interests, make good preparation for being deprived of the services of more men in these directions.

ELECTRICITY SUPPLY MEMORANDA.

The electricity supply industry has for many long years been hankering after a large heating business, but with comparatively little success. This is due to heavy cost, and to the, in cold weather, natural feeling of users that, having been persuaded to purchase electric heaters, they have been badly sold. Discomfort is not a good advertising medium. On the whole, it is an excellent thing for the electricity supply industry that "electric-fires" have not become so popular as gas-fires; for it would be a very hard job for many electricity generating stations to have to meet the violent fluctuations of demand such as gas undertakings have to encounter on the descent of atmospheric temperatures. Heating is required in cold weather during all the wakeful hours; and such a load on the top of the lighting load—the one charged out at ½d. to 2d. per unit as the case may be, the other at 3d. to 8d. as the case may be—would just about cripple a good many electrical undertakings. Heavy overlapping loads for a month or two in the year would not be an economic advantage to them. We wonder how many of them would have been able to cope with, and their managers felt happy under, such supervening heating demands as are indicated by the following figures: In January, the Gas Light and Coke Company sent out 19 p.ct. more gas than in January last year; the South Metropolitan Gas Company had to carbonize 45,000 tons more coal during the past two-and-a-half winter months than in the similar period of the winter before; and the Commercial Gas Company had an increase in consumption of 9·95 p.ct. in December, and of 15 p.ct. in January. This year up to Feb. 7, the Brentford Company sent out 106 million cubic feet more gas than in the corresponding period of last year; and during one fortnight,

A Contingency of the Heating Business.

the South Suburban Gas Company had daily demands upon them running from 30·4 to 59·7 p.ct. increases on the corresponding days of last year—the average being 41·5 p.ct. The same Company from Jan. 1 up to the date of their recent meeting had an increase of 28·2 p.ct.; and during the like period the Croydon Gas Company had an increase of 21·5 p.ct. During the week ending Jan. 31, the Birmingham Gas Department made its record with an output of 309,075,000 c.ft. Electricity supply undertakings would in many cases have found this tremendous flight in temporary business not only embarrassing but overpowering.

Still Wandering.

The comment made in the "Memoranda" for Feb. 6 on some extraordinarily loose assertions which had appeared in the "Electrician," as to "sinners" in the gas industry regarding themselves as possessed of the right to use extravagantly every ton of coal they purchase, and to destroy everything in the coal except its calorific power, received reference in the issue of our contemporary for Feb. 23. The reference is framed in paltriness. We asked our contemporary to justify its two assertions. It does not attempt the impossible task, preferring evasion to humiliation. It makes the sarcastic observation that "from the facts given in the 'GAS JOURNAL,' it is obvious that nearly everything in life most to be desired is due to the gas industry." Did we say anything that deserved such a gem of stupidity? Did we claim a single thing that cannot be justified? If our contemporary cannot give us a strightforward affirmative or negative to this question, it had better entirely ignore the inquiry than be responsible for a similar "gem." It goes on to say:

> When we said that for many years the gas engineers destroyed most things that were worth anything in coal, we referred to the time, and that *not very long ago*, when illuminating gas, notwithstanding its virtues, was innocent of candle power, and when the countryside was laid bare on account of the non-recovery of the bye-products. The "Memorandist," being a gas expert, can fill in the blanks for himself.

He cannot, though possessing a fairly intimate knowledge of the technical and commercial history of the gas industry; as a matter of fact, the meaning of the writer in our contemporary is absolutely cryptic. For close upon half a century, Parliament has fixed the standard of illuminating power for gas undertakings; and sulphate of ammonia was made in gas-works before most of the present gas engineers entered upon their professional careers. We also suggested that our contemporary should study the accounts of gas-engine manufacturers to ascertain whether gas-engine making is a decaying industry. Equally as feeble as its preceding remarks is the one that it makes upon this point:

> There is no need to study accounts, for there are still some dark corners of the earth where an electricity supply is not available, and some equally dark corners where the demand for electricity supply is so great that the plant installed is insufficiently large to cope with the demand, with the result that many people, contrary to their wishes, are compelled to use gas-engines to keep their shafting in motion.

While the "Electrician" was occupying its columns with such absurdity, the National Gas-Engine Company—one out of a number—was announcing that its net profit for last year is considerably higher than in the previous year, though not much in excess of the next best year, 1912. This result is due to increased turnover, and the very long hours worked, and not to a higher percentage of profit on the work done. The Company has invested £200,000 in the War Loan, and has given facilities to their employees to take up the loan. This does not look as though the power business of gas undertakings is confined to "dark corners of the earth," nor to places where gas-engines are put in not from choice but compulsion. We are interested in this second confirmation, from the same quarter, of our previous statement that "some of our electrical friends wander with uncertain steps directly they slip past the bounds of their own particular territory."

Share Investments in Customers' Businesses.

Mr. E. Kilburn Scott is a long way ahead of his times; so much so that he has made "Meteor" of the "Electrical Times" weep over the scandalous obstacles to progress and even self-defence that exist in the electricity supply industry. Self-defence is suggested to our journalistic friend by the "follow-up" appeal of the Hackney Borough Council to (at present) unresponsive electricity supply local authorities not to turn a deaf ear to, or rather a blind eye upon, their solicitation for a contribution to the costs of their fight with the Gaslight and Coke Company over preferential charges. Mr. Scott, we say, is a long way ahead of his times. He suggests something in an article in the "Electrical Times" that cannot happen under present statutory rule. He thinks that electrical concerns should have a direct financial stake in some of the industrial enterprises with which they have business relations—such as a colliery taking energy from the electricity concern (especially a colliery supplying coal to the latter), or mills and factories in industrial areas. He opines that there might be "co-operation" in business to mutual advantage. Other manufacturers who were not favoured by the financial interest of the electricity undertaking might scent preferential treatment, insist upon being inquisitive, and make themselves generally unpleasant to the electricity supply concern. Mr. Scott does not say where the money is to come from for all this financial investment or speculation. Parliament does not allow statutory undertakings to raise capital or otherwise to go in for share investments outside their undertakings—except so far as reserve funds are concerned in gilt-edged securities. If the investments did not turn out happily, it might be a bad thing for the electricity consumers.

Monotony or Eye Protection.

We have a good deal of sympathy with a complaint that "Meteor" in the same issue of the "Electrical Times" makes on the subject of too much indirect lighting; but we have a great deal more sympathy for those whose eyes are surfeited with the intrinsic brilliancy of metallic filament or (so-called) "half-watt" lamps. He likes a brilliant light; he hates indirect lighting and its shadowless glow. It rebukes exuberance; it makes the heart sink into one's boots; and the melancholy nature of it all suggests the propriety of moving about in slippers and not boots. He asks the question, "Are we not doing electric lighting harm by robbing it of its exhilarating qualities?" We reply that greater harm will be done to the electric lighting business by the eye-depreciation caused by the glaring and naked metallic filament. He thinks that what is happening is that "we are paying the penalty here for over-specialization in America. The illuminating engineers over the way have studied the proposition, and written papers on it *ad infinitum*. They have elaborated the fashion until they have become fanatics. It was for certain purposes a good thing; but they have ridden it to death. That is always the way with crazes in America; and when Americans become fed-up with an idea, they easily drop it." And that is only one side to the tale. The argument on the other side is a physiological one and not a psychological one.

Envious but Approving.

The gas industry is the "enemy," and not the friendly competitor, of the electrical industry. So we gather from "Electrical Industries," which has an article in a recent issue, headed "The Enemy's Advance." All the ruthlessness adopted a few years ago by the electrical industry in defaming the prime commodity of the gas industry, and in giving a false character to electricity supply—its innocence of all misdeeds in life and property destruction, while being *par excellence* a heating agent, although supplying the user with only a small percentage of the number of heat units expended in producing the electrical energy—has no recognition in the work of electrical journalists. But with common consent they applaud the work of our British Commercial Gas Association, and quite approve its policy. They do so not from any friendly feeling, but because they believe that this will act as a stimulus, and the "B.C.G.A." as an example, to the electricity supply industry. The writer in "Electrical Industries" says the war began a little too soon; if it had been deferred a bit, the electricity supply industry would have had its Development Committee at work. But it is not in operation; and the "B.C.G.A." is proceeding uninterruptedly with work, though not prosecuting its publicity campaign with such vigour as before, so as not to embarrass the gas undertakings which are unable to supply more apparatus and produce more gas [see the opening par. of the "Memoranda" this week]. It is at the same time saving money which will be available after peace for a specially vigorous revival campaign. The writer of the article in our electrical contemporary has been studying the recently issued report of the Executive Committee of the "B.C.G.A." He agrees as to the thoroughly sound policy that is being pursued, and recognizes in it a proof of the skill with which the affairs of the Association are conducted. Envious is the writer of the fact that the electricity industry has no similar organization available for taking part in the food economy campaign, conjoined with which, he omits to mention, is the fuel economy campaign. However, "altogether, in spite of the circumstances which tell against all publicity organizations, the Association continues to show, by inference, that the electrical industry is handicapped—and will feel the handicap more severely in future—by the inaction of its Development Committee."

Results from a New Electric Furnace.

A good deal has been published lately respecting an electric furnace invented by Mr. H. A. Greaves, of the Sheffield Corporation Electricity Works, and Mr. H. Etchells. Special features of the design are the application of three-phase current in a novel way—two phases being introduced through top vertical electrodes; and the whole of the hearth, which is of ordinary basic material, is connected up to the third phase, and acts as a third electrode. The hearth is not penetrated by any water-cooled studs, and is simply a solid basic lining. The arrangement of the electrodes creates such electromagnetic effects that the whole of the bath of molten metal is continually in circulation. One of these furnaces, of 3 tons capacity, has been installed at the Rotherham works of Sheffield Alloys Limited; and some particulars will be of interest. The floor space occupied is 9 ft. by 9 ft.; and the casting-pit (which is arranged for casting two groups each of four ingots), together with the ladle part, measures 24 ft. by 7 ft. The bath is basin-shaped; the lining being a full 20 in. thick. There is a patented arrangement for tilting, which is driven by a 3½-H.P. motor. The electrodes (amorphous carbons, 14 in. in diameter) are provided with carriages which are operated up and down by screwed spindles; these being driven by 3½-H.P. motors. One test shows that 2 tons of steel turnings were brought to the clear melt in 2 h. 20 min.; while a further two hours were occupied with the refining process for the production of a special nickel-chrome

vanadium steel. The furnaces are being made in standard sizes of 10 cwt., 30 cwt., 3 tons, and 6 tons. From another quarter, we learn that in a small furnace of this type designed to melt 6 cwt. in three hours, it is possible to obtain five heats of 18 p.ct. high-speed steel in ten hours. The longest time occupied from charging to finished ingots was 1 h. 40 min.; the shortest, 1 h. 15 min. It is stated that this small furnace has already made upwards of 560 consecutive heats of high-speed steel, with only one renewal of the lining. Information of costs, consumption, and charges for electrical energy, is conspicuous by its absence.

Electric Furnace Progress.

In the "Memoranda" for Jan. 30, certain information was given as to the extent of progress achieved by the electric furnace in the steel industries of the world. But apparently the figures then furnished were not complete, as "Iron Age" supplies the data shown in the accompanying table. The figures include not only furnaces constructed, but those building at present. The table is worth putting on record to show the approximate status of the competitor at the present time; but in this country the great obstacle to the use of such furnaces is the cost of power. Our American contemporary estimates that the steel output of the electric furnaces in the United States in 1915 was 69,000 tons; while in 1916 this had increased to 175,000 tons. In Germany, the output was in 1915 129,000 tons; last year, it is reported, the output had risen to 225,000 tons. The electric furnace made its entry in the steel-casting industry. But latterly there has been adoption of the furnaces for the manufacture of alloy and special steels; and it is stated that Sheffield opinion is veering round to their use for high-speed tool and special steel. The "Iron and Coal Trades Review" draws attention to the progress in Sweden of the electric process for the smelting of pig iron. In 1915, some 35,000 tons of electrically smelted pig iron were produced in that country; and it is thought that the figures for 1916 will be not far short of 100,000 tons.

Country.	Heroult.	Girod.	Induction.	Stassano.	Snyder.	Rennerfelt.	Electro-metals.	Greaves Etchells.	Miscellaneous.	Total Jan. 1, 1917.
Germany	19	5	19	2	..	..	..	..	7	52
Austria-Hungary	10	2	3	2	..	1	..	..	..	18
Switzerland	1	2	..	..	..	1	..	..	..	4
Italy	4	..	2	13	..	..	..	..	10	29
France	19	7	2	..	..	1	..	..	..	29
Great Britain	34	1	2	4	6	7	14	20	..	88
Belgium	2	1	..	..	..	..	..	..	..	3
Russia	3	1	1	2	..	7	2	..	..	16
Sweden	3	..	1	..	..	34	2	..	..	40
Norway	..	..	2	..	..	6	..	..	1	9
Spain	..	..	1	..	..	..	1	..	..	2
Japan	1	..	1	..	..	..	..	..	..	2
Mexico	..	..	1	..	..	..	..	..	..	1
Australia	..	..	..	.	..	..	1	..	..	1
Roumania	1	..	..	..	..	..	..	..	..	1
Locality not given	..	..	12	..	..	..	..	..	9	21
United States	79	4	3	1	19	13	8	..	8	136
Canada	5	..	..	..	3	..	1	..	10	19
World's total	181	23	50	24	28	70	29	20	45	471

GAS-WORKS IN WAR TIME.

A REVIEW BY MR. E. KORTING, THE GENERAL MANAGER—"ANTE BELLUM"—OF THE BERLIN WORKS OF THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

[Abstract Translation from the "Journal für Gasbeleuchtung" for Jan. 6 and 13, 1917.]

The last German report on Gas-Works' Experiences in War Time was the Presidential Address of Herr Hase to the German Association of Gas and Water Engineers, July, 1916 [*vide* "Journal," Vol. CXXXV., pp. 339, 436]. It would be regrettable were no contemporary records presented of a time so rich in experiences, as the future will bring with it other obligations. Moreover, while war continues much may be learnt from others of the difficulties which arise, and how they may be met; but in expressing one's views on such matters, regard must be paid to whether they will inure to the advantage or disadvantage of one's country. Hindenburg affords a classical example of the energetic tackling of difficulties; and the record of the German gas industry in war time is not one of which it need be ashamed. It has displayed an adaptability and vigour unsurpassed by any other branch of German industry. The author therefore suggests that his colleagues also may break silence and report their wartime experiences.

Coal Supply.

The good organization of the German coal mineowners and merchants on the one hand, and of the gas industry on the other, made it easy for the position to be laid before, and tackled by, the Ministry of Commerce directly war broke out; and a substitute had to be provided for the large quantity of English coal previously imported. Generally speaking, sufficient coal was allotted to every German gas-works; but on the works fell the responsibility of accumulating an adequate stock to tide them over times when, owing to military requirements, the transport of coal by rail might be temporarily held up. The necessity of keeping a stock for more than six weeks' requirements was a novelty to some gas-works in the neighbourhood of coalfields. The yield of tar, ammonia, and benzol being greater per ton of coal on gas-works than on coke-oven works, it was conceded that it was good policy to supply coal to gas-works in the summer months for storage rather than to coke-ovens for immediate carbonization. Of secondary importance only to this was the question of ensuring to town dwellers the wherewithal to light their rooms and cook their meals. Of how great importance such provision has become was indicated by the frightful state of things which followed the stoppage of work at the Dessau Gas-Works [*vide* "Journal," Vol. CXXXVI., p. 458].

The rule at Berlin, which gets its coal by water, had been to have four to five months' coal requirements in store on Dec. 1, and six to eight weeks' on April 1. But this rule could not be strictly adhered to in wartime. A useful Berlin practice also had been to provide for discharging large quantities of coal at a time; so that, in fact, the whole year's requirements could be unloaded in five months. Since war broke out, it has not been unusual for 4000 to 5000 tons of coal to be received on one day, and no more for several days. Notwithstanding the ample provision made to meet such fluctuations in coal deliveries, it has been deemed expedient since the outbreak of war to lay out another large siding for the discharge of coal at Mariendorf. Clearly, however, such preparations avail nothing if the coal storage yard is too small.

The quality of the coal has caused much anxiety. It was impossible to replace the missing English coal entirely by gas coal; and coking coal, house coal, small quantities of brown coal or lignite, Belgian coal, and Ostrau and Karwin coals from Austrian Moravia were supplied in turn according to traffic facilities for the time being. There was no knowing which of these would arrive, nor what proportion it would constitute of the deliveries. Points which had to be considered in carbonizing these widely divergent coals may be illustrated from the following comparison of two of the types:

	Coking Coal.	Long-Flame House Coal.
Coke produced	Good	Rather or wholly bad
Gas ,,	Little and bad	Moderately good
Tar, ammonia, and benzol obtained	Little	Moderate
Behaviour in producers	Good	Bad, from small and ashy coke
,, vertical retorts	Inflated coke hangs up	..
,, inclined retorts	Charge badly	..
Risk of spontaneous ignition in store	More or less serious	..

This comparison indicates some of the difficulties with which the gas manager has had to contend. The coal-testing plant of large gas-works has been kept feverishly busy ascertaining the behaviour of the unusual kinds of coal, and the smaller works have had to depend on information passed on to them by the larger works. But there has been much trouble with the producers owing to small coke or excessive clinker, with unsaleable coke with coal stacks firing, &c., as no one could count on getting good coal. Some improvement of the coke was attained by mixing two different coals. There was, however, no such remedy for the spontaneous ignition of stored coal; and coal silos appear to have done very badly in this respect. At the Imperial Continental Gas Association works it has been the practice to store in the open, in many small stacks all readily accessible to grabs, and to make frequent observations of the temperature in the heaps. If the temperature reaches 120° Fahr., large quantities of water are poured from above all round the heated zone.

The labour difficulties have been serious. Before the war the rule was piecework at high wages, resulting in a large output by a few sturdy men. In war time, numerous substitutes—old men and youths—were necessary to get through a minimum of work. Thus at Mariendorf, in place of 505 men in November, 1913, there were required in November, 1916, 804 men, of whom 441 were "helps." Coal also had risen in price, though not to the same extent as in some of the enemy countries. In Berlin, however,

where the competition of English coal played an important *rôle*, the rise in price was considerable. Thus in November, 1912, English gas coal was delivered in Berlin for 15s. 3d. per ton, and Westphalian for 18s. 5½d., whereas in 1916 the cost delivered was: Westphalian, £1 6s. 1½d. per ton; Silesian, £1 5s. 11d.; Ostrau, £1 10s. 6d. and upwards. If Westphalian and Silesian coals are delivered by rail instead of water, the cost is increased by 2s. to 2s. 6d. per ton.

THE RETORT-HOUSE.

There is a portentous list of difficulties in the retort-house which have to be tackled in war time. The productive capacity of the retorts is diminished by the debenzolizing of the gas and the lower grades of coal carbonized. Thus the average output of gas per retort under fire in January of each year was: In 1914, 12,714 c.ft.; in 1915, 11,901 c.ft.; and in 1916, 11,054 c.ft. It is therefore necessary to keep a larger number of retorts under fire in the winter, and to work off the poorer coals when consumption slackens, and the richer gas coals when the demand for gas rises, at the same time increasing the production of water gas in the vertical retorts. With inclined retorts, similar accommodation to varying demands is secured by eight-hour charges with poor coal and six-hour charges with good gas coal. Care has to be taken to mix the coal so that coke is produced which is fit for use in the producers of the retort-furnaces. Broad producers with large grates adapt themselves best to the bad coke, and step-grates with only a few high steps can be clinkered most readily. Some good coke—oven coke if necessary—should always be kept handy for emergency use in the producers, in case heats fall off owing to the use of bad coke from the retorts.

It is now a serious disadvantage to have only one type of carbonizing plant—such as chamber ovens, which are adapted to work off only particular types of coking coal. In Berlin, fortunately, all the good older settings had not been replaced by the modern types; and the horizontal and inclined retorts take coal which does not suit the verticals and *vice versâ*. But the old plant is of little service unless there are foremen and stokers accustomed to it. At the Oberspree Gas-Works vertical retorts only had been in use for some years; and when it was decided suddenly to bring into use a large number of semi-producer horizontal retort settings, difficulties arose in operating them, and it was then decided to extend the vertical retort installation with all speed. It seems doubtful if rarely—or never—used horizontal settings, with manual stoking, can in future be reckoned as reserve plant available for emergency use. Some of the trying work of the old settings has been reduced—*e.g.*, frequent clearing of ascension pipes and scurfing with inclined retorts. Heavier charges, smaller dip, and the cessation of English coal supplies have effected this—scurfing is now done at intervals of seven weeks, instead of every ten days as formerly.

An engineer's careful training of foremen and old hands now well repays him. One large inclined retort-house, with 60 p.ct. of new hands, is worked with the same number of men as in peace time. With vertical retorts, where the staff had been selected for rapidity and kept to a minimum, it is otherwise; and it is necessary to keep a 50 p.ct. increased staff to make up for the slower working and the difficulties arising from the coke hanging-up in the retorts, &c. Thus at Mariendorf, in November, there were required in the retort-house: In 1913, 150 men for a production per 24 hours of 11,242,000 c.ft., and in 1916, 223 men for a production of 11,655,000 c.ft.

It is necessary to exercise strict control of the temperature in vertical retort-settings, if serious breakdowns are to be avoided. Regard has to be paid to the charge of coal being normal; and if the skilled foreman has been called up, his untrained successor will not discriminate between coal and coal, and the results may be disastrous. Thus he will treat coal from a heated store heap, which has already been half distilled, and will consequently be worked off in six hours, as fresh coal, and leave it in the retort for eleven hours. The result will be overheating of the retort, which will consequently be bulged. Some security against such effects may be had by using Dinas fire-brick for the lower sections of the retorts. Or the new foreman may neglect to see that every retort is fully charged, and in the partially-filled retorts the gas will be superheated and produce severe tar stoppages. The first care with modern settings in war time should therefore be to organize adequate supervision. In Mariendorf, this has been done by placing a certain number of new hands under those of the old men whom it has still been possible to retain. Owing to the prolonged working, due to causes already mentioned, the coke conveyors have been running almost continuously, with consequent increased wear and tear. Renewals and repairs at the proper time have been made with difficulty, owing to scarcity of iron; and the same remark applies to the fire-brick material of the settings. The paucity of bricklayers has added to the trouble of getting all the settings overhauled in the slack season; and in 1916 some of the settings were not ready for use until November.

In the retort-house graphite has been satisfactorily used in place of lubricating oil. Economy in stoker's gloves has been promoted by the offer of premiums for long wear. Paper gloves have been introduced in some cases; but they do not withstand wet. Power for driving retort-house machinery has been subject to interruptions; and dual supplies have proved invaluable. At Mariendorf, steam and gas engines have been retained, in addition to electricity, for the coal and coke machinery. This proved fortunate, as, owing to new attendants, the works' electricity supply installation was at one time out of action for eight days. At the Weissensee works, the public electricity supply, from which power was taken for the coke conveyor, almost completely failed, and it was decided to provide as quickly as possible for coupling the conveying plant up with the works' steam power.

(To be continued.)

WAR SAVINGS ASSOCIATIONS.

AN APPEAL TO PERSONS OF SMALL MEANS.

By A. CANNING WILLIAMS, Treasurer of the Edinburgh and Leith Corporations' Gas Commissioners.

> "Money is a good soldier, Sir, and will on."—Sir JOHN FALSTAFF.
>
> "There is no way in which civilians can render more valuable service to the country at the present time than by promoting the formation of War Savings Associations."—OFFICIAL LEAFLET.

IT is not expected that the war loan, successful though it was, will meet the full monetary needs of the country in the life-and-death struggle through which it is passing. The expenditure of the nation, including advances to the Allies, amounts to the large total of upwards of £6,000,000 a day, or more than £4000 per minute; and at this rate the £1,000,000,000 of new money raised will disappear in about six months. The figures are so immense as to be almost inconceivable; but this should not make persons of small means imagine that their savings would be too infinitesimal to be of any help. The backbone of the nation consists of persons of small means; and what they lack in individual wealth, they make up in numbers. Every little helps.

WAR SAVINGS CERTIFICATES.

In war savings certificates the millions have a grand and unprecedented opportunity of investing their sixpences and shillings—"little drops of water" which will help to wash away the German menace, and "little grains of sand" which will assist in building the future peace of Europe on a firm foundation.

As nearly everybody knows, the certificates are sold at 15s. 6d. each, and £1 each is paid for them at the end of five years from the date of purchase. The profit of 4s. 6d. is equal to 5¾ per cent. per annum simple interest, or slightly more than 5 per cent. compound interest. Any individual, whatever his income, may hold from one to five hundred certificates—costing from 15s. 6d. to £387 10s. A husband, his wife, and his children may individually hold up to 500 certificates; they may be bought by one person on behalf of, and in the name of, another person; and they may be purchased by two or more persons in their joint names. No income-tax is payable on the interest in any shape or form.

If, before the end of the five years, an investor in certificates should require to withdraw his money, he may do so (by making application at a post office) on the following scale:

	£	s.	d.
Before the end of the first year.	0	15	6
At the end of the first year	0	15	9
" " " second year	0	16	9
" " " third year	0	17	9
" " " fourth year	0	18	9
" " " fifth year	1	0	0

There are hundreds of thousands of salary and wage earners in the country who might easily spare 15s. 6d. or more per month for the purchase of certificates; but there is a far larger number whose incomes are so little in excess of their actual necessities that they cannot afford to purchase, at one time, a certificate outright. These are the people who should join an Association, and so obtain collectively what they are unable to get individually.

HOW TO FORM AN ASSOCIATION.

A large number of War Savings Associations have been formed up and down the country; and they are multiplying astonishingly. They are, in fact, distinctly fashionable. It will soon be discreditable for any business or other concern of fair size to be without one. Trade unions, friendly societies, churches, clubs, and schools should vie with each other in this worthy object. It is easy to set the machinery going. The first thing to do is to call a meeting of those interested, and decide to form an Association. The secretary, treasurer, and one or more additional members to act as a Committee should be appointed, and the name of the Association fixed—for example, "The Edinburgh and Leith Gas-Works War Savings Association." Then a request for affiliation should be made to the Local Central Committee, who will supply free all the necessary books and forms. Each member will, in due course, be provided with a card, on which the coupons he receives in exchange for his contributions are to be attached. The smallest contribution is usually fixed at 6d.; but any number of sixpences may be paid at one time. As soon as the payments amount to 15s. 6d., a war savings certificate is handed to the member, and he experiences the pleasure of possession, and the stimulation to continued and, if possible, increased endeavour.

BENEFITS OF ASSOCIATION.

An important point to bear in mind is that, by joining an Association, a member obtains a certificate dated on the average

fifteen weeks earlier than the date when he completes his contributions in respect of it. This is forcibly stated in "Leaflet A:"

> If 31 people individually save 6d. a week for 31 weeks they will each have a certificate at the end of 31 weeks and not before. But if they join an Association to which they each pay 6d. a week, the Association will be able to buy one certificate each week; and at the end of 31 weeks will have 31 certificates. The first of these certificates will be dated 30 weeks earlier than a certificate bought by any member acting alone and saving 6d. a week; the second certificate will be dated 29 weeks earlier; and so on. On the average the certificates will be dated 15 weeks earlier if no members withdraw, and earlier still if there are many withdrawals.

In many cases firms, &c., in their desire to help in the good work, are advancing money for the purchase of certificates, recouping themselves out of the members' instalments as paid.

There are wiseacres—men with little knowledge of human nature—who argue that it is equally easy for a man whose wages are small, or whose expenses in maintaining a family swallow up nearly every penny that he earns, to set aside 6d. a week, and buy a certificate at the end of 31 weeks, without the help of an Association. Those who know more than the wiseacres laugh at this easychair and library philosophy. It would require more than the average amount of determination to religiously each week put the sixpence in the money-box. Something would be sure to turn up which would prevent the regular depositing of the cash, and even if the sixpences were set aside for some weeks, there would probably come a time when the temptation to spend the "nimble" coins upon some fleeting pleasure or unessential thing would be too strong to resist. By joining an Association, these temptations are removed, and a healthy spirit of emulation among the members is fostered, which benefits not only the nation, of which we are all component parts, standing or falling together, but does immense good to the individual, in that it tends to cultivate in him that spirit of thrift and self-reliance on which so much depends.

It may be truly said of money invested in War Savings Certificates, as Portia said of mercy, that "it is twice blessed; it blesseth him that gives and him that takes." Will you not bless and be blessed by joining an Association—To-day?

COAL STATISTICS FOR 1915.

From the Annual Home Office Report.

The figures which are contained in the abbreviated Annual Home Office Report on Mines and Quarries for 1915 relate to the first complete year's working under war conditions. Parts II. and III. (relating respectively to labour and output) have quite lately made their appearance, signed by Sir R. A. S. Redmayne (Chief Inspector of Mines); and though small in size they furnish a good deal of information which should be put on record for future reference. The tables given enable most of the figures abstracted in former normal years to be quoted; but, as remarked in mentioning the report last week, the details with regard to exports and imports of coal are on this occasion omitted.

The output of coal in 1915 was 253,206,081 tons, of a value at the mines and quarries of £157,830,670. When compared with 1914, these figures show a decrease in output of 12,458,312 tons, and an increase in value of £25,233,817; the actual totals for the year being an output of 265,664,393 tons, having a value of £132,596,853. Going back to 1913, the output was 287,430,473 tons, and the value £145,535,669; in 1912 (the year of the great coal strike), 260,416,338 tons, value £117,921,123; and in 1911, 271,891,899 tons, value £110,783,682. The average price of coal at the pit was 12s. 5·6d. per ton in 1915, compared with 9s. 11·79d. in 1914. The value of the coal at the mines for each of the preceding four years was: In 1913, 10s. 1·52d.; 1912, 9s. 0·68d.; 1911, 8s. 1·79d.; and 1910, 8s. 2·36d. It will be seen how favourably all the figures compare with those of the year now under notice.

Of the total falling-off in output for the year 1915 of 12,458,312 tons, there was a decrease in the English fields of 6,489,716 tons, in Wales of 2,710,247 tons, in Scotland of 3,250,506 tons, and in Ireland of 7843 tons. The complete figures were: England, 178,055,861 tons, of a value of £105,404,560; Wales, 39,468,807 tons, value £30,552,875; Scotland, 35,596,856 tons, value £21,817,302; Ireland, 84,557 tons, value £55,933. The total output of anthracite (included in the statistics relating to coal) for the twelve months was 4,712,145 tons, which was valued at £3,568,658. In the preceding year, the output was 4,718,993 tons, and the value £2,711,172.

The tables give the approximate price of coal per ton at the mines for each county in which it is raised; and these figures show that in the case of England the price varied from 9s. 1·93d. in the North Riding of York to 14s. 8·81d. in Monmouth; the average being 11s. 10·08d. For Wales, the highest figure (omitting from the calculation anthracite) was 15s. 10·82d. for part of Glamorgan, and the lowest 11s. 2·43d. for part of the coal coming from Carmarthen—the average working out at 15s. 5·78d. In the case of Scotland, Dumbarton occupied first place, with 14s. 8·98d. per ton; and Haddington the lowest, with 10s. 5·62d.—the average being 12s. 3·10d. As to Ireland, the figures range from 16s. 6·07d. in Tyrone, to 10s. in Leitrim, with an average of 13s. 2·76d. The average for the whole of the fields worked out at 12s. 5·6d.

The report states that the quantity of coal exported in the year under review (exclusive of coke and manufactured fuel, and of coal shipped for the use of steamers engaged in foreign trade) was 43,534,560 tons, which compares with 59,039,880 tons in the preceding year, and 73,400,118 tons in 1913. In 1915, there was also, in addition to the quantity already named, the equivalent of 1,683,837 tons of coal exported in the shape of 1,010,302 tons of coke, and the equivalent of 1,102,564 tons of coal in the form of 1,225,071 tons of manufactured fuel. Adding to this the 13,630,964 tons shipped for the use of British and other steamers engaged in foreign trade, the total quantity of coal which left the country was 59,951,925 tons, as against 80,993,890 tons in 1914.

It is further stated that of the coal exported as such, France received over 17⅓ million tons, Italy more than 5¾ million tons, Denmark 3 million tons, Sweden 2½ million tons, Norway the same amount, the Netherlands 1¾ million tons, the Argentine 1½ million tons, Spain a like figure, and Egypt over 1¼ million tons. In round figures, the quantity taken by France in 1914 was 12¼ million tons; by Italy, 8½ million tons; and by Germany, 5¼ million tons. In the pre-war year of 1913, France took 13 million tons, Italy 10 million tons, and Germany 9 million tons. Of the total quantity of 253,206,081 tons of coal raised in 1915, the amount remaining for home consumption for all purposes was 193,254,156 tons, or 4·193 tons per head of the population. This compares with 184,670,503 tons, or 3·977 tons per head of the population of the United Kingdom, in 1914. In 1913, the quantity which remained for home consumption was equal to 4·108 tons per head of the population. Of the total for the year 1915, 37,284,600 tons were used in the manufacture of coke and briquettes, and 2,509,456 tons of coal with 9,746,743 tons of coke (equal to 16,244,572 tons of coal) in the blast-furnaces for the manufacture of pig-iron. In the previous year, 36,289,010 tons of coal were used in the manufacture of coke and briquettes, and 18,381,106 tons in blast-furnaces.

Figures with Regard to Coke.

As is customary, particulars are included in the report relating to the production of coke and briquettes, and the number of coke-ovens in use in 1915. Returns of production of coke were received from 141 colliery owners, comprising 188 separate works (two works less than for the preceding year), from 1495 gas companies (five less than last time), and 22 other owners of coke-ovens, comprising 23 works. The counties of Durham and York furnished 62 p.ct. of the total quantity of coke made at coking-ovens; and 63 p.ct. of the total number of ovens were being worked in these counties. Of the 211 works other than gas-works where coking plant is in use, bye-products—principally sulphate of ammonia and tar—were recovered at 116. In 1914, the number was 103; and in 1913, it was 88.

The total quantity of coal used in the manufacture of coke in 1915 is put at 35,690,342 tons; the amount of coke obtained being 20,059,140 tons—8,150,200 tons from gas-works and 11,908,940 tons from coke-ovens—of a total value of £18,270,018. In the previous year, there was an output of 18,970,925 tons of coke—7,920,669 tons from gas-works and 11,050,256 tons from coke-ovens—of a total value of £13,252,526. Of the output from gas-works in 1915, 6,939,540 tons came from England, 165,991 tons from Wales, 850,050 tons from Scotland, 187,594 tons from Ireland, and 7025 tons from the Isle of Man. There were 16,574 coke-ovens in use; 7521 of them being of the beehive type—a drop from 9210 in the preceding year. Of the remainder, the five types most largely adopted were Otto-Hilgenstock 2034, Simon-Carvés 1766, Coppée 1343, Semet-Solvay 1251, and Koppers 1241. There were 1,697,541 tons of briquettes produced, of a selling value at the place of manufacture of £1,755,406.

Other Materials.

The total output of iron ore during the year 1915, from mines and quarries in the United Kingdom, was 14,235,012 tons—imported ores bringing the total up to 21,109,767 tons, the quantity of pig iron made from which was 8,723,560 tons, the value of which, according to the average export value for the year, would be £49,618,351. Of this, 4,567,351 tons, valued at £25,978,359, were pig iron from British ore.

The output of oil shale for 1915 was 2,998,652 tons. The average price per ton at the mines was 5s. 6·98d.; the total value being £836,593. The figures for 1914 were 3,268,666 tons, of a value of £837,249. The average yield of oil for Scotland is 20 gallons, and of sulphate of ammonia 44 lbs. per ton of shale. The quantity of petroleum imported into the United Kingdom in 1915 was 588,469,699 gallons; the value placed upon it being £13,305,495. This was 58,242,932 gallons less, but £549,288 more in value, than in the preceding year.

Lessing's Oil-Scrubbing Plant.—When proposing a vote of thanks to the staff at the annual meeting of the Crowborough District Gas Company, the Chairman (Mr. Andrew Dougall, M.Inst.C.E.) referred to the fact that the Manager (Mr. A. G. Cheal) had, with the permission of the Directors, arranged to instal the new type of oil-scrubbing apparatus devised by Dr. R. Lessing. The Company would thus, he added, have the honour of being the first to work this system. It may be pointed out that Dr. Lessing described this method in a paper read last month at a meeting of the Society of Chemical Industry, and reproduced in the "Journal" for Feb. 20, p. 347.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Forty-Seventh Annual Meeting.

The Forty-Seventh Annual Meeting of the Institution was held last Saturday, at the Grand Hotel, Manchester. In the unavoidable absence of the President (Mr. Edward A. Harman, M.Inst.C.E.), who was confined to bed with a severe cold, Mr. J. C. BELTON, of Chester, one of the Past-Presidents, took the chair.

THE PRESIDENT'S ILLNESS.

The CHAIRMAN, in opening the proceedings, said he regretted that he quite unexpectedly found himself in the chair, owing to the illness of the President.

The HON. SECRETARY (Mr. G. S. Frith) read a letter received from the President, who wrote that he was terribly disappointed that he was kept in bed by his doctor's orders, and hoped that his regrets would be conveyed to the members.

The CHAIRMAN said he thought it would be a graceful act on their part if they sent a telegram to Mr. Harman expressing regret at his absence, and their sympathy with him in the circumstances.

The meeting instructed that a telegram should be sent accordingly.

VOTES OF CONDOLENCE.

The CHAIRMAN said his next duty was the sad one of referring to losses during the year. It would be a mere platitude to say that they regretted the losses that they had sustained since their last meeting. They were filled with a very deep sense of the loss that they had sustained by the removal, by death, of the late President, Mr. J. G. Newbigging, and of that promising young engineer, Mr. A. Morton Fyffe. Letters of condolence had in each case been sent to the friends of the deceased; and it only remained for members to confirm the action taken by rising in their places.

The meeting took the action suggested.

ANNUAL REPORT AND BALANCE-SHEET.

Letters of regret at inability to attend having been read,

The CHAIRMAN moved that the annual report and balance-sheet should be taken as read.

In the course of their report the Committee point, with pleasure, to the fact that the Institution continues in a prosperous condition. The membership roll stands at 201—an increase of 1 on the previous year. There have been three resignations; two names have been removed under rule 15; and three members have died during the year. The death of Mr. J. G. Newbigging, M.Inst.C.E. (Manchester), was, it is remarked, a very sad blow to the Institution; and the Committee with feelings of the deepest regret record their high appreciation of the valuable services rendered during his two years' continuous office as President, under trying war conditions. He was elected a member in 1884, and "was undoubtedly one of the most foremost and active members of the Institution." They also regret to record the death of Mr. A. Morton Fyffe, of Blackburn, who was elected a member in 1911, and was recently appointed on the Committee. "His business abilities and personality will be much missed." Mr. W. H. Nutter, of St. Annes-on-Sea, "an old and respected member of the Institution, who was elected in 1887, also passed away during the year."

After detailing the proceedings at the several meetings of the members during Mr. Harman's presidency, it is stated that the Committee have considered and recommended twenty applications for certificates to be granted by the Institution of Gas Engineers to gas-fitters over 35 years of age.

The annual reports of the Lancashire and the Yorkshire Commercial Sections have again been distributed to the members. "The excellent work carried out by these District Sections cannot be over-estimated, as they undoubtedly render most useful assistance to the members from time to time."

The finances of the Institution are, the Committee mention, in a very satisfactory condition—the credit balance being £28 19s. 4d.

Mr. WM. HILL (Stalybridge) moved the adoption of the report and balance-sheet; and this, being seconded, was carried unanimously.

REPORTS OF COMMERCIAL SECTIONS.

Mr. S. MEUNIER (Stockport), Chairman of the Lancashire Commercial Section, presented the report of the section. He said he suggested that the Commercial Sections had undoubtedly proved their worth. No harder, or better or more difficult work had been done, and no better results had been achieved than during the past year. They would see from the report of the Manchester Section the enormous number of subjects that had been dealt with, and the amount of correspondence and the interchanges in endeavours to derive assistance in the various difficulties, as to the good that they had attempted to do. He was sorry to say that these efforts had not proved of very much value; but at any rate they had tried, and in trying they had justified their existence.

Mr. J. H. BREARLEY (Longwood) said the meetings of the Yorkshire Section during the year had been well attended—there having been an average attendance of 24. When they considered the times in which they lived, this showed that the members appreciated the value of the discussions that they had had. He should like to emphasize the tribute of thanks to Mr. Meunier for his services in introducing the commercial scheme years ago. Every member of the Yorkshire Section now realized the value of the work which Mr. Meunier did then in organizing these sections; and he believed they were quite correct in attributing the genesis of the British Commercial Gas Association to the inception of the Manchester Commercial Section about eighteen years ago. He was quite sure the members appreciated the Yorkshire Section; and he could assure them that the shortness of the report gave no indication of the work been accomplished in Yorkshire.

The CHAIRMAN said they all appreciated very highly the work of the District Commercial Sections.

Upon the motion of Mr. T. DUXBURY (Oldham), the reports were adopted.

INDUCTION OF PRESIDENT.

The CHAIRMAN said it was only four years since he occupied the position which Mr. Walter Whatmough occupied that afternoon. He could, therefore, fully sympathize with his feelings. He could assure him that, in taking the chair, he would do so with the best wishes of every member that his year of office would be one of the most prosperous and happy of any President who had filled the position. Mr. Whatmough had served the Association well for a great many years; and they all much appreciated the magnificent work that he had done. The presidential chair was the highest honour the members of the Association could confer upon one of themselves; and in this case they did it with the very best wishes and the heartiest goodwill of them all.

THANKS TO THE RETIRING PRESIDENT.

Mr. W. WHATMOUGH (Heywood) then took the chair. He said the first duty of all incoming Presidents was to move a vote of thanks to the retiring President; and he had great pleasure in doing this. Mr. Harman had had a very successful year. The meetings had been well attended. They had discussed most important subjects bearing upon their industry; and he should be very glad indeed if, at the termination of his own year of office, he would be able to look back upon it and think it had been as successful as Mr. Harman's had been. They all sympathized with Mr. Harman very greatly in his sickness. He asked them to join with him in passing the vote of thanks to Mr. Harman for his services during the year.

Mr. BELTON said he had great pleasure in seconding the resolution. Mr. Harman was his neighbour when he was in Staffordshire; and a truer and more kindly hearted man he had never known. He was sure that during his year of office Mr. Harman had sustained the traditions of the position as they had all expected him to do.

The resolution was carried.

REPRESENTATION ON THE INSTITUTION COUNCIL.

The PRESIDENT moved—"That Mr. G. S. Frith (Runcorn) be the representative of the Institution on the Council of the Institution of Gas Engineers for 1917-18." He said Mr. Frith was an able Hon. Secretary, and worked very hard indeed for the Institution. He thought that it would be rather an exceptional thing to have a County Justice of the Peace to represent them on the National Council.

Mr. H. KENDRICK (Stretford) seconded the resolution; and it was carried unanimously.

Mr. FRITH said he thanked them very sincerely for electing him to so important an office. He would do his best to carry out the wishes of the district. He was only sorry that Mr. Whatmough could not go on beyond the three years that he had served as their representative.

GRANTS OF FUNDS.

Upon the motion of the PRESIDENT, seconded by Mr. MEUNIER, a sum of £10 10s. was granted to the Benevolent Fund of the Institution of Gas Engineers.

Upon the motion of the PRESIDENT, seconded by Mr. TURNER, it was resolved that a grant of £5 5s. should be made to the British Commercial Gas Association.

Mr. MEUNIER proposed—"That a sum of £10 10s. be granted to the Y.M.C.A." He said last year they gave this sum to the Red Cross Society; and at a meeting of the Committee a little while ago he suggested that they might now extend their sphere to include other deserving objects, and change about as occasion might occur from year to year. Everywhere throughout the whole sphere of the war they would find "Y.M.C.A." It had been a home from home for the men. Its organization had been magnificent, and its results in benefits to the men would be amply proved, he was sure, when they came back from the war.

Mr. SAMUEL GLOVER (St. Helens) seconded the resolution with pleasure, because it was merely in substitution for the one which he had moved on behalf of the Red Cross Society.

Mr. T. DUXBURY (Oldham) supported the resolution; and it was carried.

AN INVITATION FROM HEYWOOD.

The PRESIDENT said before he gave his address he wished them to hear a few words from his Chairman—Alderman Healey, J.P.,

of Heywood—who might have to leave for another engagement before he had finished.

Alderman Healey said he had come to the meeting to listen to the address of the new President, and also to extend an invitation to them to visit the works with which Mr. Whatmough was connected. If they could possibly make it convenient to visit Heywood, in the present time of stress, owing to the war, he could assure them that the Heywood authorities would try to make them as heartily welcome as they possibly could do. He could promise them that he was proud that he was the Chairman of their new President, whom he had known for many years. He had sat on the Gas Committee for seventeen years; so that he knew something of Mr. Whatmough's work. He could assure them that he was not loud and boisterous in his ways, and would not be one of those who said a great deal and did nothing, but would be a hard worker who would conscientiously carry out all his duties as President. This was not the first time he (the speaker) had been among them; and he hoped it would not be the last. He felt that they, being chiefly public works officials—and not therefore inclined, like men in private businesses were, to keep to themselves any specially useful knowledge that they possessed—recognized a duty in regard to these gas undertakings of the country to keep in close touch with one another, and to share with each other for the benefit of the public generally any knowledge that would be for the public good.

Mr. Glover said he should like to move the thanks of the meeting to Alderman Healey for coming to visit them, because the Alderman was a friend of the industry as well as a friend of their President, and to thank him also for his invitation, which they accepted most heartily.

Mr. Belton said he had great pleasure in seconding the vote of thanks to Alderman Healey, and supporting the remarks of Mr. Glover in appreciation of the Alderman's visit as well as his invitation.

The resolution was carried.

THE PRESIDENT'S ADDRESS.

The President then delivered his address.

My thanks are due to you for electing me to the honourable position of President of the Institution; and with the assistance and consideration which have always been extended to me by the members in the various offices it has been my privilege to hold, I have reason to believe that my year of office will be a pleasant one.

The annual report again shows that the Institution continues to prosper. The membership roll is in excess of last year; and the finances are in a satisfactory condition.

Year by year we have to mourn the loss of members; and the past year has not been without its toll. By the unexpected death of the ex-President, Mr. John Gibson Newbigging, the Institution has lost a most valuable member; and his genial presence and ripe experience will be missed in the troublous times through which we are passing. We also regret the death of Mr. Morton Fyffe, whose career was so suddenly cut short. He had only recently been elected on the Committee, and the members were looking forward to many years of useful service for the Institution. In the person of Mr. W. H. Nutter, of St. Anne's, a well-known and very highly respected member has also passed away. Our sympathy goes out to those members whose sons have made the great sacrifice; and we hope that those who are still serving their country may be spared to return to their homes in due time, as victors in the fight for freedom.

As the Institution consists almost wholly of chief officials engaged in serving their country for munitions of war and the public service, only a few have joined the Colours; and the following members constitute the "Roll of Honour:" Captain W. E. Brock, of Denbigh; Captain W. M. Carr, of Ormskirk; and G. S. Sayner, formerly of Harrogate.

It is astonishing how rapidly the *personnel* of the Institution changes. Out of a total membership of 201 to-day, there are only 96 who were on the roll ten years ago, or 47 p.ct.; and compared with twenty years ago, 39 or 19 p.ct. The Institution was founded forty-seven years ago, and is the oldest in the Provinces. Though the title "Manchester and District" does not adequately describe the area now covered by the Institution, few would desire to see the name changed. The works controlled by the members manufacture 56,729 million c.ft. of gas per annum, which is equal to 25 p.ct. of the total output of the United Kingdom. It is interesting to note the various districts represented by the members, which are as follows:

	Number of Members.
Lancashire	75
Yorkshire	60
Cheshire	26
Derbyshire	10
Nottinghamshire	7
Staffordshire	7
Wales	8
Other countries and overseas	8
Total	201

The gas industry continues to give its loyalty to the nation under trying conditions in the supply of gas for munitions and for the extraction of toluol and benzol; and it cannot be emphasized too strongly that gas authorities are not doing this work for profit—the amount received for tar being considerably less than pre-war prices.

The subject of tar dehydration and the extraction of benzol to be introduced by Mr. Mottram at this meeting will afford members an opportunity of further ventilating their views on this important question.

REDUCED OUTPUTS.

With the exception of munition areas and other centres due to war conditions, gas consumption shows a decline due to the operation of the Summer Time Act and the Defence of the Realm Act. The reduced consumption, the increased cost of coal and other materials, and the advance in wages, have rendered it difficult for gas authorities to carry on without loss. Coal alone represents a minimum increase of 40 p.ct., as against the average increased price for gas of 18 p.ct.; so that the public have been treated with generous consideration, and it should be remembered that the shareholders of gas companies working under the sliding scale receive less dividend for every penny increase in the price of gas.

COALS, RESIDUALS, AND LABOUR.

Uppermost in our minds are the important matters of coal supplies, the purchasing of materials, the disposal of residuals, and the labour question.

Coal contracts will shortly be falling due; and now that the Government have taken over the control of the mines, we must hope the Board of Trade with the assistance of the contractors and Coal Supplies Committee will ensure satisfactory deliveries at the prices ruling under the Coal Prices Limitation Act.

The purchasing of materials to carry on will become more difficult should the war be prolonged for a lengthy period; and to have goods in possession equal to a twelve months' supply is desirable. Fortunately, the disposal of coke does not cause any anxiety; and good prices are being obtained except in some towns where prices are low, owing to local conditions.

The suggestion by the "B. C. G. A." for the establishment of centres for selling coke for motor transport wagons is a scheme which deserves consideration. My Committee have already opened a depôt in the centre of the town, supplying vertical retort coke broken to apple size and screened in bags ready for loading. Although the new project has only been in operation a short time, application has been made for a contract to supply coke for a fleet of motors. In this particular case, anthracite was previously used; but vertical retort coke is more economical and cleaner.

Another transport contractor, whose garage is nearly twenty miles from Heywood has tested the coke, and reports that for a journey of twenty-three miles with a load of 5 tons 2 cwt. and a gross tonnage of 11 tons 10 cwt. the weight of coke used per mile was 12 lbs., and 25 p.ct. less than the coke ordinarily used for the same journey and under similar conditions.

The vertical coke has also been used with satisfactory results at the electricity works for steam-raising; and, in response to a request for working results, the late Electrical Engineer informed me that 6 lbs. of fuel were used per unit generated on the average of two boilers, one of which was fired with coke and the other with coal. The average saving in favour of coke over coal was 2s. 7d. per ton.

The question of sulphate of ammonia manufacture and supply may safely be left in the hands of the Sulphate of Ammonia Association, although in the regulation of prices for acid and sulphate, the Government might have shown a more generous disposition towards sulphate makers.

The distillation and disposal of tar is a problem which requires immediate consideration. After making every allowance for war conditions, it is unfair that there should be a difference of 9s. per ton paid for tar in the same locality. The old question of combination has been taken up by the National Council; and as action in this direction must be begun locally to be successful, the subject will no doubt be more effectively dealt with by the affiliated Institutions. Combination to establish works for the purpose of tar distillation is full of difficulties, and requires careful consideration. The solution of the problem seems to be in the direction of small works combining to sell, on an approved sliding-scale, to larger gas undertakings where tar distillation is already in operation.

The question of labour in gas-works is very acute; and should the war be prolonged it will be more difficult next winter. If high explosives are dependent upon the bye-products of gas manufacture, it is essential that sufficient man power should be provided for gas undertakings. By co-ordination it should not be difficult to supply the comparatively few men required; and no doubt the National Council will take this serious question in hand with the Ministry of Munitions preparatory to next season's demands.

INSTITUTION WORK.

The "Manchester District" is considered an active Institution and the papers which have been contributed to the "Transactions" have no doubt materially assisted in the progress and development of the gas industry. But I do not remember that, since its formation, there has been any contribution in the interests of the members themselves. I therefore venture to suggest, in view of certain cases which have recently been submitted to the Council of the Institution of Gas Engineers, that security of tenure should be a subject for consideration; and, if possible, a scheme should be formulated whereby the members of the Institution may receive help and protection whenever the necessities of the case may demand it.

It is pleasing to record that, in the public service, acts of injustice have been few and far between; but, unfortunately, such

cases do occasionally arise. It is only fair that, under these conditions, a member should have the right to submit his case to an independent tribunal for consideration. Local authorities have their respective Associations in defence of their own interests; and these bodies realized many years ago that united action was their only safeguard.

I fully recognize that the present state of the law renders the task a difficult one. But public opinion has great influence; and the question should be taken up by the various Associations affiliated with the Institution of Gas Engineers. The Associations could deal with the cases arising in their respective districts, and submit the information to the Parliamentary or Special Committee of the Institution appointed for the purpose, who would adjudicate upon the facts placed before them, and take action if necessary. In the case of local authorities, there should be no difficulty in obtaining the right of appeal to the Local Government Board.

Then there is the question of Saturday afternoon meetings, which has often been discussed, and upon which there is a divided opinion. There is no industry that requires more attention and constant supervision than gas manufacture and supply; for throughout the year night and day the wheel goes round, and total exemption from Saturday afternoon meetings might justly be claimed. I would suggest that we break away from our old custom, and that at least one meeting in the coming year be held on some other day.

For several years it has been my privilege to represent this Institution on the Council of the Institution of Gas Engineers, and the results of the proceedings have been reported to your Committee. But there are matters which arise from time to time that are of sufficient importance to be submitted to the members, and which might with profit be discussed, so that the representative may go armed with the representative opinion of the whole of the members. Then again it would give the members the opportunity of ventilating any subject that may be of interest in the progress and development of the parent Institution.

The National Council which has recently been formed is a desirable combination of the various interests of the industry to deal with matters of national importance; and the questions already dealt with by them will be appreciated by the gas profession generally. It remains to be seen whether the parent Institution maintains the distinguished position which it has enjoyed in the past, and the position of the gas engineer requires to be safeguarded.

CARBONIZATION.

The question of the best system of carbonization has been a difficult problem for many years, and continues to be so. Five years ago—owing to the existing carbonizing plant at Heywood being obsolete—it was necessary that reconstruction should take place on modern lines; and tenders were invited for vertical retorts and horizontals with stoking machinery. As the net estimated cost per ton of coal carbonized, including interest and sinking fund, was the lowest for vertical retorts, and as the system lent itself to our local conditions, the Gas Committee decided to accept a tender for a Glover-West plant, on the continuous principle.

There is no need to give a full description of the installation, as the system is now well known; but I give a plan and section to show the arrangement for dealing with the coal and coke under our conditions. The coal is tipped into the breaker from a high-level road, and the coke emptied from the discharging bunker into trucks which run on lines to the hoist. It is afterwards delivered to the storage hoppers or coke yard as required.

There are sixteen retorts in four sections of four retorts each, with one producer to each bed of eight retorts. The plant is capable of carbonizing 500,000 c.ft. per day and represents two-thirds of our production; the peak load being carbonized on the old system of horizontal retorts and generator furnaces with hand labour. Unfortunately, therefore, I am unable to give working results separately extending over a lengthy period for verticals only.

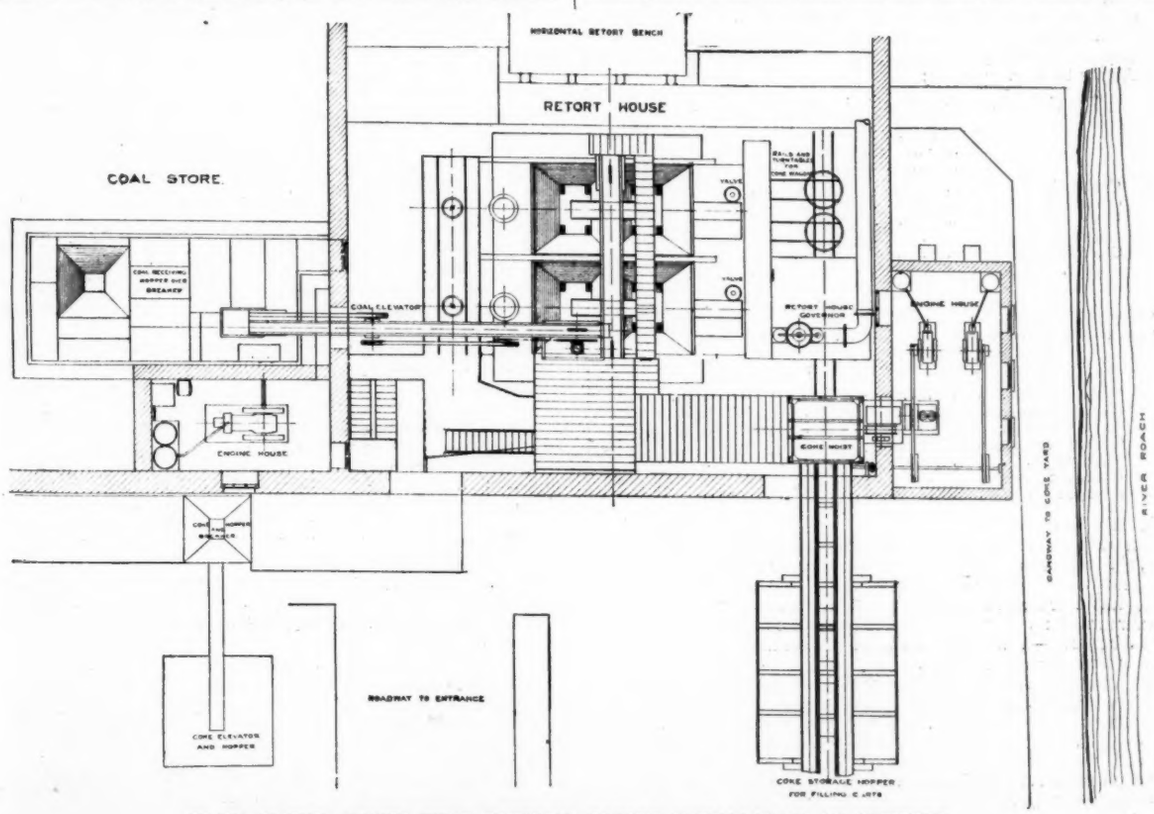
The plant was started with eight retorts on March 13, 1913; and the following statement represents the net cost into the holder for gas manufactured (balance-sheet figures) for three years ended March 31, 1916, compared with three years working with horizontals hand charging, 1911-13.

Net Cost of Gas in Holder for Verticals and Horizontals for Three Years ended March, 1916, compared with Horizontals, Hand Charging, Three Years ended March, 1913.

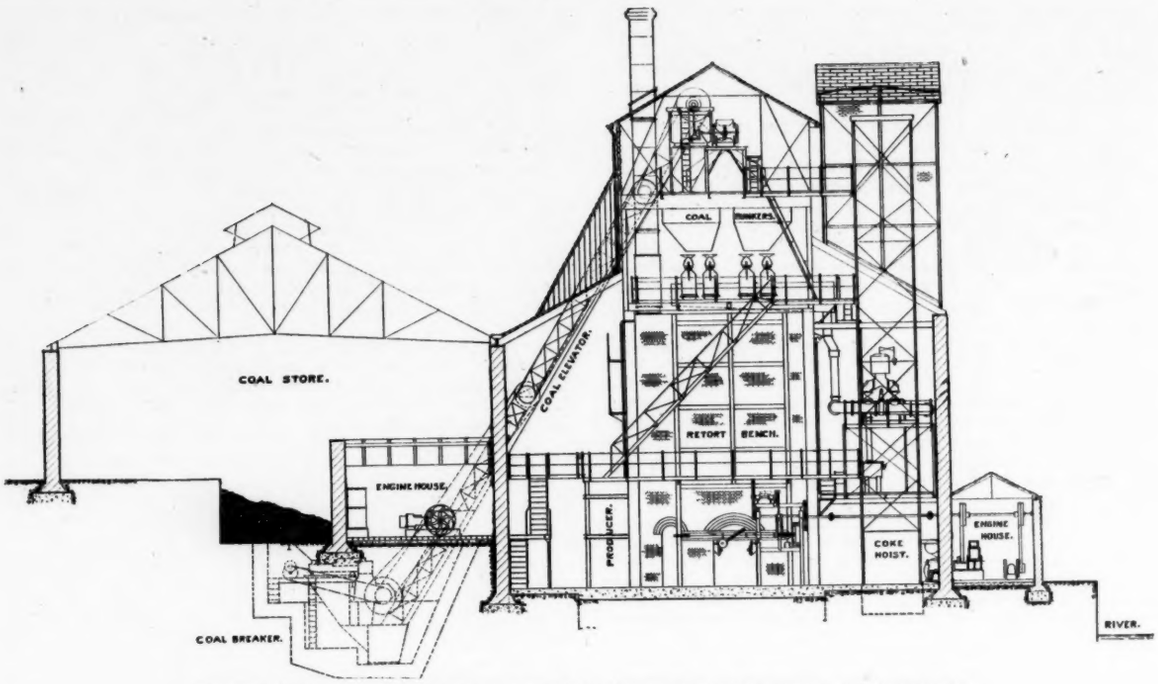
Year.	Coal Carbonized. Tons.	Make per Ton. Cub. Ft.	Gas Manufactured. Cubic Feet.	Coal less Residuals per 1000 C.Ft.	Purification per 1000 C.Ft.	Wages per 1000 C.Ft.	Maintenance per 1000 C.Ft.	Net Cost in Holder per 1000 C.Ft.
				d.	d.	d.	d.	d.
1911 .	12,186	10,990	133,923,000	4·48	·12	3·40	2·21	10·57
1912 .	12,324	10,803	133,142,000	3·79	·20	3·47	2·73	10·19
1913 .	12,671	11,029	139,751,000	5·03	·22	3·71	3·06	12·02
Average	12,394	10,941	135,605,000	4·56	·17	3·53	2·67	10·93
1914 .	12,167	12,196	148,398,000	6·45	·18	2·09	2·31	11·03
1915 .	11,875	12,190	144,768,000	6·33	·09	2·17	2·63	11·22
1616 .	11,769	12,033	141,613,000	7·88	·00	2·53	2·43	12·84
Average	11,937	12,140	144,926,000	6·87	·09	2·26	2·45	11·67

The foregoing statement represents actual figures; but to arrive at a true comparison, it is only fair that the 1911-13 prices for coal and residuals should be taken. On this basis, and not including the increased cost of materials and rate of wages, the three years ended 1916 show on the average a saving of 2·02d. per 1000 c.ft. of gas manufactured, equal to £1220 per annum.

The statement only includes ordinary repairs to the verticals, except in the case of three retorts which had become damaged by fusion, the sections of which had to be renewed. This would not



PLAN OF THE GLOVER-WEST VERTICAL RETORT INSTALLATION AT HEYWOOD.



SECTION OF THE GLOVER-WEST VERTICAL RETORT INSTALLATION AT HEYWOOD.

now be necessary, as experience has proved that the damaged portion of a moulded retort can be satisfactorily repaired with segments.

The maintenance costs amount to 2·45d., compared with 2·67d. But the heavy cost will have to be borne when the retorts require resetting; and as there is every indication that this will not require to be done until 1918, it would only be fair in comparing the cost of upkeep to do so on a five years' average instead of three.

We have been able to use a cheaper quality of coal for the verticals compared with horizontals, and the following statement gives the percentages of coal purchased:

	Screened. Per Cent.	Unscreened. Per Cent.	Dry Slack. Per Cent.	Washed Slack. Per Cent.
1911-13. .	19	38	43	0
1914-16. .	12	44	16	28

The screened and unscreened coal were the same quality during the whole period; but the dry slack was of better quality than the washed slack, for which we paid 6d. per ton extra.

Tests of various qualities of coal have been made from time to time, and the following statement gives the results of coal tested from Aug. 7 to Aug. 14, 1916:

The Coal Carbonized consisted of the Following:

23 per cent. screened coal
24 ,, ,, unscreened coal
52 ,, ,, washed slack

Coal carbonized	161 tons
Gas manufactured	1,940,000 c.ft.
Make per ton of coal	12,049 ,,
Illuminating power	16·19 candle No. 2 Met.
Calorific value—gross	542 B.Th.U.
,, —net	488 ,,

	Cwt.	Qr.	Lb.
Coke made per ton of coal carbonized	14	3	4
Coke used for producers do.	2	3	22 or 14·73 p.ct.

Composition of Gas.

Carbonic acid	1·82 per cent.
Heavy hydrocarbons	2·22 ,,
Oxygen	0·20 ,,
Carbon monoxide	9·76 ,,
Methane	29·16 ,,
Hydrogen	51·48 ,,
Nitrogen	5·36 ,,

We have not been so fortunate as some other works in the amount of work performed by our men. When working the whole plant, six stokers are engaged, and one man in addition elevating coal, oiling, &c. The wages paid are 5s. 9d. per shift of eight hours, time-and-half on Sunday. The net cost for labour only is a maximum of 1s. 2·77d. and a minimum of 1s. 0·98d. per ton of coal carbonized—a higher figure than the estimate, partially due to the increased rate of wages.

This amount includes elevating coal, charging coal, and taking out coke, rodding, scurfing, oiling, cleaning coke chambers, and attention to plant generally, but not any portion of the foreman's wages. The cost for hand-charging on the old system was 2s. 8·10d. per ton of coal carbonized.

The saving of labour with the vertical system has been of great advantage—especially in the exceptional times through which we are passing. We have been fortunate in only requiring twelve men for our maximum output, against twenty-seven men under the old system. So that the labour conditions in the retort-house have been normal.

Invariably, there are difficulties with all new systems; and vertical retort carbonization is no exception to the rule. But, with careful supervision and attention, the plant works well. Experience proves that with our quality of coal, and with all retorts in full work, 480,000 c.ft. of gas per day is good working.

The retorts are scurfed on the average once in eight weeks, and as the average time for scurfing (including emptying) is two days, the average number of retorts at work, when working the whole plant, is 15·29, which on the basis of 40 tons for sixteen retorts, equals 38 tons, or an efficiency of 95·5 p.ct.

There are no stopped pipes, and the accumulation of ammonium chloride crystals mixed with tar in the collecting main and pipes has given very little trouble. Every mouthpiece is connected with steam, and steaming at 30 lbs. pressure takes place for ten minutes prior to and during the draw; and as the operation of drawing is carried out every two hours, steaming averages two hours per diem.

The vacuum is regulated by a retort-house governor, which gives 2-10ths at the top of the retort and a level gauge at the bottom. The length of the retort to the top of the coke discharge flange is 23 ft. The action of the coke on the walls of the retort so far does not appear to have made an appreciable difference; but this cannot be ascertained until the retorts are again cooled-down and thoroughly examined.

The system lends itself to producing gas of constant illuminating power and calorific value, and affords facilities for stretching the gas if required. The flexible character of the plant is thus of great advantage. The regulation of each retort, and also the whole of the retorts, may be done with ease.

The dust from the coke when emptying the retorts is objectionable; but I understand this has been overcome.

Although the coke is invariably grey when discharged from the bunker, it is necessary to quench with water as a safeguard against firing.

The size of the coke compared with the coke carbonized in horizontal retorts is as follows:

	Verticals.	Horizontals.
Over 2-inch screen	58·8 per cent.	56·8 per cent.
,, 1 ,, ,,	22·8 ,, ,,	32·6 ,, ,,
,, ½ ,, ,,	7·0 ,, ,,	4·6 ,, ,,
,, ¼ ,, ,,	6·1 ,, ,,	3·0 ,, ,,
Breeze	5·3 ,, ,,	3·0 ,, ,,

The total cost of the plant, including work carried out by the Corporation, was £9403; and the net saving for three complete years ended March, 1916, on a comparable basis, was £3660. Thus, at the same rate, the capital will be redeemed in the next five years.

TRANSPORT.

Transport generally has been a difficult problem since war was declared; and at gas-works not favoured with a private railway siding on the works, and dependent upon a carrying contractor for the conveyance of coal and other materials, deliveries in most cases have been unsatisfactory. In the winter of 1914 the carting contractor to the Corporation failed to fulfil his contract; and the Committee decided to purchase plant for the purpose of carrying out the work. Tenders were invited for motor and horse

traction; and, after investigation, the decision was in favour of horse traction. As there appears to be a general desire in favour of motor traction, it may be useful to others contemplating similar work to give the estimated working costs of both systems—based on a tonnage of 10,000 tons per annum:

One 3-ton motor	10·84d. per ton
One 5 ,, ,,	11·03 ,, ,,
Two 3 ,, motors	12·91 ,, ,,
Three horses and carts	11·86 ,, ,,
Two 3-ton one-horse wagons and one horse and cart	10·37 ,, ,,

Quick loading is essential for short journeys with motor traction; but, as arrangements could not be made for the erection of hoppers at the station, the estimate was in favour of horse traction with 3-ton wagons, and this system was adopted by the Committee. The actual cost for the last financial year was 10·25d. per ton. I have not given capital costs and revenue charges, as the figures would be misleading under present conditions.

RATING.

At a meeting of the Wales and Monmouth District Institution of Gas Engineers, Mr. Kensole in his Presidential Address dealt at some considerable length with the rating of gas-works; and the importance of the subject must be my excuse for referring to a matter which has so recently been treated, and which has so often been before the gas industry.

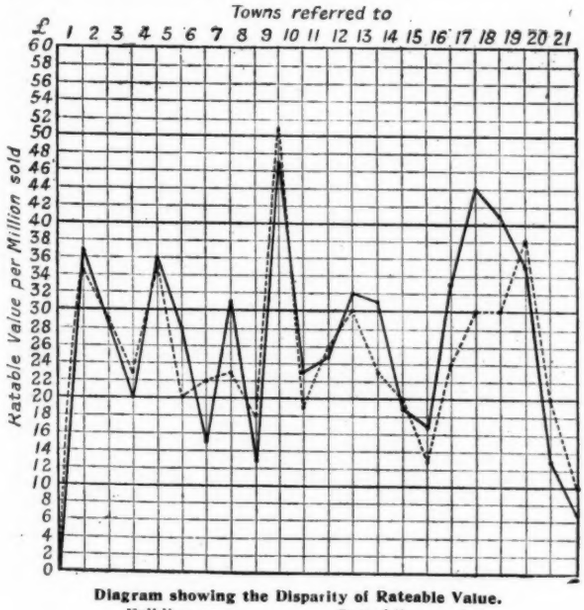


Diagram showing the Disparity of Rateable Value.
Full line, 1903. Dotted line, 1916.

In 1903, my Committee successfully appealed against the valuation of our works; but the reduced amount is still very high compared with the majority of undertakings. It is interesting to compare the statement prepared on that occasion with the same works to day, particulars of which are appended.

It will be observed that the total rateable value of the twenty-one towns has been increased from £78,472 to £87,513, and the amount paid for rates £23,576 as against £37,663, or an increase of £9041 and £14,087 respectively. The gas sold in 1903 was 2,815,792,000 c.ft. and in 1916 3,340,460,000 c.ft., or an increase of 524,668,000 c.ft.; and taking the rateable value on this basis 1916 gives an average of £26 per million, as against £27 for 1903—the maximum being £51 and £47, and the minimum £10 and £7 respectively. The average increase in the amount paid for rates is 0·72d. per 1000 c.ft., and represents an increased charge on the total gas sold of £10,021 or 26·8 p.ct.

In view of the many calls and ever-increasing expenditure of local authorities, the rates must inevitably be advanced, against which there is no appeal. But the great disparity in the rateable value due to different methods in arriving at a valuation calls for united action for the establishment of equality of rating. The accompanying diagram clearly demonstrates the inequality of the present system.

STAND-BY CHARGES.

Under the Heywood Corporation Act, 1909, powers were given to make a minimum stand-by charge to consumers of electricity supplied by the Corporation, and to others who generated their own current, or who had suction gas plants, on the following scale:

	When Gas Consumption does not amount to the following per quarter. £ s. d.
For 10 light meters, but less than 20 light	0 5 0
,, 20 ,, ,, ,, 50 ,,	0 7 6
,, 50 ,, ,, ,, 100 ,,	0 10 0
,, 100 ,, ,, ,, 150 ,,	0 12 6
,, 150 ,, ,, ,, 200 ,,	0 15 0
,, 200 ,, ,, ,, 250 ,,	0 17 6
,, 250 ,, ,, ,, 300 ,,	1 0 0
,, 300 ,, ,, ,, 350 ,,	1 2 6
All over 350 light	1 5 0

When the charges were brought into operation, there was much opposition, and several consumers had the gas supply disconnected rather than pay the small charge. The revenue will average about £10 per annum; and although the principle of the charge is just, it is doubtful whether the small amount received is worth the friction and unpleasantness which the enforcing of the charge entails.

FUEL ECONOMY.

The question of fuel economy now under consideration by the British Association Fuel Economy Committee is no new subject to gas engineers; for during the last twenty years, and more especially in recent years, coal consumption has been materially reduced by the increased production of gas, and by the increased output of coke per ton of coal carbonized. Then, again, the large quantity of gas used for industrial purposes, gas cookers, and fires has also materially assisted in the economizing of fuel. But

Return of Rateable Value, &c., of Various Gas Undertakings.

No.	1903. Coal Carbonized Annually	Gas Manufactured, c.ft.	Gas Sold, c.ft.	Total Capital Expended.	Income for Gas, Coke, Tar, and Liquor, not including Meter and Stove Rents.	Gross Profit.	Rateable Value Works and Mains.	Amount Paid for Rates not including Income-Tax.	Rateable Value per £1000 of Income.	Rateable Value per Million c.ft. of Gas Sold.	Rates Paid per £1000 of Income.	Rates Paid per 1000 c.ft. of Gas Sold.	1916. Gas Sold, c.ft.	Rateable Value Works and Mains.	Rateable Value per Million c.ft. of Gas Sold.	Amount paid for Rates, not including Income-Tax.	Rates paid per 1000 c.ft. of Gas Sold.
	Tons,	Thnds.	Thousands.	£	£	£	£	£	£	£	£	d.	Thousands.	£	£	£	d.
1*	12,791	129,442	117,565	85,539	20,818	6,283	4,282	1,096	205	36	52	2·23	128,367	4,346	34	2,112	3·95
2	34,700	374,900	337,829	367,752	56,533	17,800	9,458	2,928	169	28	52	2·08	381,311	10,953	29	4,421	2·78
3	18,379	177,459	162,796	130,405	27,824	8,050	3,251	1,102	117	20	39	1·62	141,091	3,306	23	1,580	2·69
4	35,363	376,449	365,312	279,574	55,673	16,371	12,748	3,872	229	35	69	2·54	391,318	13,264	34	5,354	3·28
5	11,472	116,410	111,623	72,274	—	9,654	3,168	536	—	28	—	1·15	169,563	3,486	20	852	1·20
6	4,600	48,697	45,963	57,054	8,279	3,677	714	196	86	15	23	1·02	78,053	1,735	22	630	1·94
7	12,803	143,039	136,482	112,840	24,162	6,715	4,243	1,413	175	31	58	2·48	171,122	4,105	24	2,131	2·99
8	8,315	92,290	77,764	50,561	14,080	3,112	1,040	338	74	13	24	1·04	93,668	1,735	18	846	2·17
9	5,561	61,228	54,508	47,437	11,419	3,990	2,605	842	228	47	74	3·71	54,109	2,774	51	1,080	4·78
10	13,140	136,133	121,721	79,912	20,653	5,022	2,873	876	139	23	42	1·72	157,899	3,004	19	1,443	2·19
11	14,867	144,505	133,319	93,996	24,401	7,147	3,337	972	136	25	40	1·75	168,384	4,339	26	2,179	3·11
12	13,802	149,066	141,735	159,695	25,946	9,013	4,492	1,226	173	32	47	2·07	157,239	4,700	30	2,134	3·26
13	5,700	55,500	51,500	36,284	9,800	2,800	1,577	525	161	31	53	2·44	65,000	1,557	24	648	2·39
14	10 to 11,000	117,000	108,436	129,169	19,113	4,904	2,024	668	106	19	35	1·47	128,137	2,609	20	1,160	2·17
15	—	—	93,390	94,881	17,138	3,857	1,590	365	92	17	21	0·93	156,496	1,963	13	808	1·24
16	5,483	57,219	54,582	45,878	10,872	655	1,840	584	169	33	53	2·56	80,009	1,957	24	897	2·70
17	13,198	136,637	133,085	156,686	27,215	11,891	5,875	1,665	216	44	61	3·00	209,955	6,339	30	2,575	2·94
18	7,180	75,509	68,353	57,335	14,195	4,718	2,770	844	195	41	59	2·96	93,435	2,843	30	1,205	3·10
19	23,000	238,750	218,250	156,522	44,392	11,886	7,551	2,655	170	35	60	2·92	205,000	7,887	38	3,416	4·00
20	16,048	165,000	159,841	128,425	24,909	7,995	2,169	623	87	13	25	0·93	150,000	3,000	20	1,461	2·34
21	13,078	132,081	121,728	160,850	22,649	8,886	865	250	38	7	11	0·49	160,304	1,611	10	731	1·09
			2,815,782				78,472	23,576	2965	573	898	41·11	3,340,460	87,513	539	37,663	56·31
								Average	141	27	43	1·96	—	—	26	—	2·68

* Heywood.

the cherished hope of a low-priced gas to develop this side of our business is not likely to be realized for many years to come. I would therefore suggest that consideration should be given to the question of working costs, differential rates, and the adaptation of charge to the various classes of consumers.

The principle has been carried out in a large measure for power and industrial purposes, but I submit that the principle deserves more consideration for other apparatus, especially gas-fires—the price to be based on the net cost in the holder *plus* the actual charges for distribution and a reasonable return on the capital expended. It is only by working with a small margin that future business in the direction indicated may be obtained, thereby enabling gas authorities to reduce the cost per 1000 c.ft. for fixed charges which will correspondingly reduce the charge to all consumers. A 10 p.ct. increase in consumption in our case represents a reduction in fixed charges of 1·56d. per 1000 c.ft. or £917 per annum.

May I give an example from the Electricity Committee of our own Corporation? Finding that the plant was incapable of supplying the demand for current, application was made to the neighbouring Corporation of Bury for terms to supply in bulk, which they agreed to do at cost price—the term cost price being manufacturing charges only. Heywood has made a good bargain, and Bury is satisfied, as the interest and sinking fund charges will reduce the average net cost to their electricity consumers.

If we are to increase the day load, it is desirable that the gas-fire business must be developed on more liberal lines. Moreover, we want to face the smoke problem in a really practical manner, and to see that all the products of coal shall be utilized to the utmost for the benefit of the nation.

MAINTENANCE.

For many years our Corporation had a scheme for the maintenance of burners at low rates for labour, with a charge for materials at the ruling prices. But labour is now free, which is much appreciated by the gas consumers. With the substitution of the standard of calorific value for the standard of illuminating power it is very desirable that the inspection and maintenance of burners should be universally established, in order to prevent complaints, as a contented consumer is an asset to any undertaking.

HIGH PRESSURE.

The inconvenience suffered by the public, due to restricted lighting under the Defence of the Realm Act, will cause a reaction when normal conditions are renewed; and no doubt high-pressure lighting will be in great demand. Shortly before the outbreak of war, in response to a petition from the tradesmen of the town, the Gas Committee installed a system of high-pressure outside shop lighting, which has given satisfaction and proved a good advertisement.

There are now fifty-six 1000 c.p. lamps supplied; but as seventeen lamps were only fixed a short time prior to the lighting restrictions being brought into force, I can only give the complete balance-sheet for an installation of thirty-nine lamps. There are two compressors, each of a capacity of 500 c.ft. per hour, and the whole of the lamps are on the Keith system.

The following is a statement of the capital expenditure and revenue:

HIGH-PRESSURE OUTSIDE SHOP LIGHTING.

Balance-Sheet for the Twelve Months ended Oct. 31, 1914.

Capital Expenditure.

	£ s. d.	£ s. d.
Two "A" size compressors coupled to "No. O" gas-engines, including valves and pressure gauges		80 0 0
High pressure 4-inch steel main		90 13 1
Lamps—		
35 1000 c.p. at £3 9s. 9d. each	122 1 3	
2 500 ,, ,, £2 8s. 4½d. ,,	4 16 9	
1 2000 ,, ,, £9 ,,	9 0 0	
1 300 ,, burner only	0 9 4	
		136 7 4
Wages		102 2 4
Joiners' work		6 7 3
Reflagging and paving		50 0 0
Sundries		1 19 6
Total		£467 9 6

Income.	£ s. d.	*Expenditure.*	£ s. d.
35 1000 c.p. lamps at £4	140 0 0	160 mantles at 8d. each	5 6 8
2 500 ,, ,, ,, 55s.	5 10 0	28 globes at 7s. 6d. ,,	10 10 0
1 2000 ,, lamp. . .	6 10 0	10 gallons oil at 1s. 8d.	0 16 8
1 300 ,, ,, . . .	1 0 0	20 lbs. waste at 2½d.	0 4 2
		Men's time lighting and cleaning engines and lamps	33 18 2
		547,000 c.ft. of gas at 1s. 3d.	34 3 9
		Balance	68 0 7
Total . .	£153 0 0	Total . .	£153 0 0

The profit of £68 will redeem the cost of the lamps in three years' time, and in addition during the same period would allow 7 p.ct. profit on the remaining capital. The number of globes used was 28 or 0·71 per lamp per annum, and mantles 160 or an average of 4·01 per annum.

PUBLIC LIGHTING.

Public lighting is a misnomer at the present time; but I cannot resist placing on record the diagram showing the result of modern conditions of incandescent lighting, where gas is supplied to the public lamps on the average meter system.

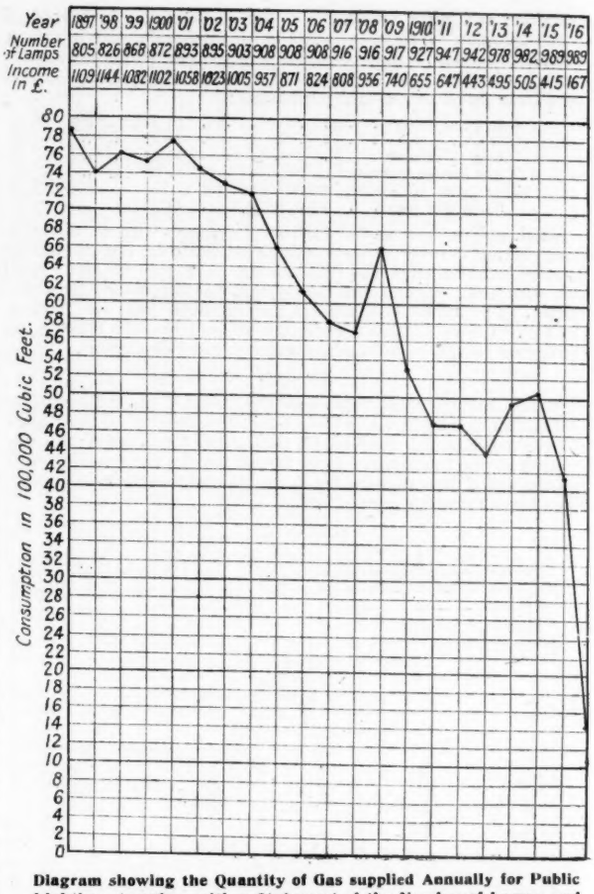


Diagram showing the Quantity of Gas supplied Annually for Public Lighting, together with a Statement of the Number of Lamps and the Annual Income for Twenty Years—1897 to 1916.

The diagram shows the quantity of gas supplied by the Gas Committee to the Lighting Committee for the public lamps of Heywood for the last twenty years, from 1897 to 1916, and the annual revenue for the same period. In 1897, the consumption for 805 lamps was 7,900,000 c.ft., in 1914 (pre-war) 5,100,000 c.ft. for 982 lamps. This, upon the 1897 basis per lamp, would be equal to a consumption of 9,637,000 c.ft.; so that there is now a saving equal to 4,537,000 c.ft. per annum.

Owing to the reduced consumption and the reduced price of gas, the actual revenue has decreased from £1109 to £505, or a reduction of £604; but taking the increased number of 177 lamps into consideration, and at the same rate, the reduction is £847.

The ratepayers receive the benefit; and after making allowance for upkeep, the saving is equal to 2d. in the pound on the district rate.

DAYLIGHT SAVING.

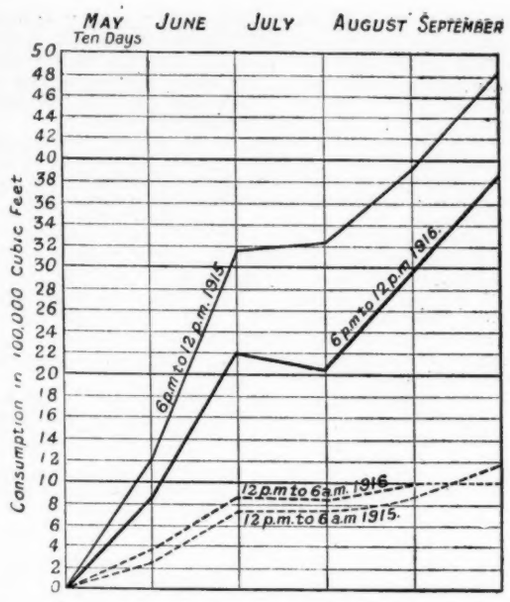
There is every indication that the Summer Time Act of last year will be placed permanently on the statute book; and although the change is for the ultimate good of the people, there is no doubt gas undertakings for the period of the order will lose considerable revenue.

The Act came into force on May 21 and terminated Sept. 30, 1916; and I have taken out figures showing the consumption from 6 p.m. to 12 p.m. midnight and from 12 p.m. to 6 a.m. the following day during that period. It gives unexpected results for the month of September. On reference to the diagram (p, 463) it will be seen that compared with 1915 from 6 p.m. to 12 p.m. there is a decrease for each month, and a total decrease of 4,332,000 c.ft., or 21·45 p.ct. Taking the same period, 12 p.m. to 6 a.m., there is an increase to August; but September, with the darker mornings, shows a decrease. Apparently, there is no special cause for this; but the net result shows a gain of 1·44 p.ct. The net loss, however, on the twenty-four hours' basis is only 10·15 p.ct.

MISCELLANEOUS TOPICS.

The Commercial Sections have again justified their usefulness in the various matters appertaining to that branch of the Institution's work; and it is incumbent upon all members to join their respective districts, should they desire to benefit the authorities they serve.

The Junior Association continues to do good work; and though the membership is considerably reduced owing to war conditions, interest has not been lacking in the proceedings. I express the desire that when normal times appear, the example of the late Mr. Edward Allen, of Liverpool, when President of the Institution



Summer Time Act, 1916.—Record of Consumption from May 21 to Sept. 30, 1916, compared with the Corresponding Period of 1915.

of Gas Engineers, should be followed, and the Junior Institution be invited to select one of their members to contribute to the "Transactions" of this Institution.

After the war there is every indication that education will emerge from the chaotic state in which it is to-day; and, in the reformation, the gas industry should be prepared to take its part by establishing the training of the juniors on sound, scientific, and business lines. Every endeavour should be made to raise the standard; and, as an inducement to get the best men, the remuneration must be attractive and the well-trained man receive his just reward.

Year by year appeals are made to the members of the Institution of Gas Engineers by the Benevolent Fund Committee; but the response is very feeble to so deserving a cause. Were it not for the invested funds, the result of more liberal contributions in years gone by, many deserving cases would not now receive help. As a former member of the Committee, I can assure the members that every case is thoroughly investigated, and the funds carefully administered. In view of the economic condition of the country and as the financial obligations of the members for some time to come will have a much greater burden to bear than formerly, there does not appear to be much hope of increased contributions to the fund by voluntary effort. The perennial pleading for further contributions would be obviated, and the anxiety of the Committee in regard to finance would be considerably diminished, if the Institution increased the annual subscription and allocated a fixed sum to the Benevolent Fund.

In the early days of the war, it was deemed advisable not to hold the usual meetings; but after a time the familiarity of the situation changed the views of the Committee, and the meetings are now held as usual. As time advances, however, the situation becomes more critical; and as legislation is constantly changing; and matters of importance appertaining to gas practice are involved, it may be advisable for members to meet in conference more frequently, so that the various problems may be discussed and criticized. If necessary, our views may be formulated, and those of national importance be forwarded to the National Gas Council for guidance and assistance.

The strenuous days in which we live are not conducive to the writing of a presidential address; but should any information which I have been able to impart be useful to the members, I shall be satisfied for any labour entailed in its preparation.

In conclusion, I hope ere the close of the year that the Allies may have accomplished their object in freeing the Continent of Europe from the domination of the tyrant, and that a lasting peace may be established.

Appreciation of the Address.

Mr. T. Duxbury (Oldham) moved a vote of thanks to the President for his address, which he said it would be well worth their while to read over quietly after they left this meeting, when they would be able to obtain valuable information from the matters contained in it. The address was one of the best they had ever had; and it had been a surprise to him that Mr. Whatmough had been so well able to collect his thoughts in times which were so strenuous for gas engineers. He (Mr. Duxbury) wished to express his appreciation of the Council in electing his friend Mr. Whatmough to the position of President. He agreed with Mr. Belton that there were very few members who had done more quiet work than their new President. Mr. Whatmough had always put his shoulder to the wheel in all that he had done during the twenty-five or twenty-six years they had known him; and he never relaxed his shoulder-push, but had always been ready to do anything he could in furtherance of the interests of the Institution, and for the benefit of its members. They remembered the time when Mr. Whatmough was their Hon. Secretary, and the vast amount of work he put into the performance of his duty and the pleasant and sociable way in which he treated all the members of the Institution. They were all delighted to see Mr. Whatmough in the chair, and sincerely wished him every success during his year of office.

Mr. R. Watson (Doncaster) seconded the resolution. There was, he said, a great deal in the address which invited, and would obtain, careful reading. Mr. Whatmough had proved very positively that he had not been affected by the strenuous times which he said in his address did not conduce to the writing of presidential addresses.

The vote of thanks was carried unanimously and heartily.

The President thanked the meeting for the kind words which had been spoken; and said he was conscious of his failings nevertheless. If his address had satisfied them, however, it had fully served its purpose.

Tar Dehydrating and Debenzolizing Plant.

Mr. A. E. Mottram (Ossett) then read a paper on this subject, which (together with the discussion to which it gave rise) appears on pp. 464-7 of this week's issue.

Thanks to Officers.

Mr. H. Kendrick (Stretford) moved a vote of thanks to the officers, and particularly to the Hon. Secretary for the manner in which he carried out his duties.

Mr. T. Duxbury seconded the resolution.

The President said he had particular pleasure in supporting the appreciative references to the work of the Hon. Secretary.

The resolution was carried.

Mr. James Braddock (Hon. Treasurer), being called upon by the President to reply, said no praise would be too high for the work of the Hon. Secretary. It was very satisfactory to himself to see the Institution so flourishing as it now was. He was present at its first meeting; and now it was its forty-seventh year. It was a source of pride to him that he had been permitted to be attached to the Institution for so long a period; and he knew that it had done an immense amount of service to the gas industry.

Mr. Frith, also replying, said it was quite a treat to work for the Institution—everybody was so pleasant and enthusiastic.

The meeting then closed, and the members took tea together.

Industrial Canteens.

The part which gas is taking in connection with the activities of the Welfare Department of the Ministry of Munitions, is the subject of an "Industrial Canteen Book," which has been produced by the Richmond Gas Stove and Meter Company, Limited. In all spheres of industry, the practice is being adopted of fitting-up canteens for the workers; and for use in such canteens, gas, for cooking and heating apparatus of all descriptions, is easily first, from whatever point of view the matter may be considered. What gas can do, and what it is doing, is of course well enough known to "Journal" readers; but the Richmond booklet will be exceedingly helpful to them in bringing this all-important matter to the attention of those who have not so far had the same opportunity for studying it. The desirability of providing proper facilities for adequate feeding arrangements—*i.e.*, for the industrial canteen—will be admitted by anyone who reflects carefully upon present-day factory and workshop circumstances; and the Committee appointed by the Ministry of Munitions to consider the Health of Munition Workers has, as already pointed out in our pages, emphasized the fact. A canteen, then, being an all-round advantage, the equipment and conducting of it are questions of moment to employers; and these matters are dealt with in the best way in the Richmond booklet—that is, by means of an illustrated description of, the installation and working of an actual canteen for 600 persons, the kitchen of which is equipped with gas apparatus throughout. Another feature of the *brochure* is a ground floor plan of a works kitchen, showing the arrangement of apparatus needed to provide for approximately 850 hands. But the booklet does more than bring to the notice of an employer what an excellent kitchen can be fitted up with gas as the fuel—it tells him what it will cost; specifications and prices being given for installations of various capacities—for 50, 100, 250, and 500 employees. Clearly set forth as it is, with illustrations and dimensions of the different appliances specified, this information should prove very useful.

Masonic.—At last month's meeting of the St. John's Lodge, No. 348, held at the Masonic Hall, Bolton, Bro. Joseph Taylor was installed Worshipful Master in the presence of a large number of Grand Officers and brethren in the Province of East Lancashire and other visitors. W. Bro. J. W. Scott, of the "Northern Star" Lodge (Manchester), assisted with the musical portion of the ceremony, which was rendered by Bro. Ditchburn's party from Manchester Cathedral.

BRITISH INDUSTRIES FAIR.

There is being held, in the buidings of the Victoria and Albert Museum and the Imperial Institute, the third British Industries Fair, organized by the Department of Commercial Intelligence of the Board of Trade. It will remain open until Friday, of this week, by which time, it is safe to say—judging from the attendance last week—an enormous number of buyers for home and overseas markets (to whom admission is officially restricted) will have inspected the display.

Experts are, of course, attracted particularly to one department or another; and, so far as the gas industry is concerned, the only one of the five branches of industry included which is really connected with it is that of glass. Of the firms showing in this section, there are in the Classified List of Exhibitors some nine or ten placed under the heading of "Lighting Glass." But on the different stands goods of this description do not by any means bulk so largely as do some other kinds of glassware, admirable specimens of which are on view. Considering, however, the disabilities to which all kinds of work of this non-warlike character are now subject, no one will assume that the absence of an imposing show in any particular line arises from unwillingness, or inherent inability to manufacture. Rather should what is exhibited now be taken as an earnest of what is to come, when labour and other conditions get back a little nearer to normal.

Viewed in this light, the fair is full of encouragement; for everywhere among the 440 exhibitors there is evidence of the first-class work which British manufacturers are capable of turning out. A general visitor will certainly be struck—to mention only two sections—by the beautiful examples shown of cut glass and fancy leather articles; and the high level of excellence attained by the latter is specially remarkable, when it is learned that many of the firms showing have only taken up the manufacture of this class of goods since the outbreak of war. Mention should be made, too, of the laboratory glass, of which there is a very creditable display. The Board of Trade point out that the progress in the chemical glass and porcelain trade has been very pronounced; and a new organization, called the British Chemical-Ware Manufacturers' Association, has been formed, with a view to facilitating the distribution of orders for this class of goods among the members whose works are specially designed to produce the various specialities required.

DESCRIPTION OF A TAR DEHYDRATING AND DEBENZOLIZING PLANT.

By A. E. Mottram, of Ossett.

[A Paper read before the Manchester District Institution of Gas Engineers, March 3.]

On the outbreak of the war we received word from our tar contractors that the contract was broken, and that they could not guarantee to remove the tar. This, together with the low price we were obtaining for it, caused us to put in a tar-dehydrating plant, and we have not regretted it. We decided on a Wilton 100-gallon per hour plant.

The tar runs from our large overhead storage tank into the feed tank, from which it is pumped by a small Evans wall-pump through the economizer, where it is heated-up by the hot tar coming away from the still. Entering the coil still at the bottom, it passes upwards—being heated by a Wilton coke-breeze furnace. It leaves the still at the top, through a pipe on which are fixed a gauge, thermometer, and safety valve, and enters the vapour box near the middle. From here the tar falls down into the economizer, whence it is run into large storage boilers for sale.

The light oils vapourize over from the vapour box through a water-cooled condenser into the separator; the weak liquor being run back into the well, and the light oils run into a storage boiler. A steam pipe is connected to the bottom of the vapour box. The waste gas passes through a small purifier into the air.

When starting-up the plant, we circulate the tar round and back into the feed-tank until the thermometer shows the desired temperature. Then by an arrangement of cocks, it is passed through the rest of the plant. In the same way, when setting-down the plant we reduce the fire, and circulate the tar back into the feed tank, and finally wash-out by pumping liquor through, so as not to leave the tar to stiffen as it cools and so block-up the plant.

It is very simple to work. The temperature can be regulated by the forced-draught furnace or by the speed of the little pump; the temperature quickly rises if the pump is slowed-down so as to reduce the speed of the flow of tar.

When making tar for the Road Board Specification No. 1, we work at 160° to 180° C.; and for Specification No. 2, at 220° to 240° C. The back-pressure in both cases is about 30 lbs.

When working on benzol, the creosote oil follows the same course as the tar, and is then passed through a water-cooled condenser into the creosote storage tank, to be used over again. The benzol follows the same course as the light oils, and is collected in steel drums at the outlet of the separator. When working on benzol, we run at a temperature of 110° to 115° C., with just a little steam on the vapour box. Superheated steam should be used if possible.

The working cost is small. One man looks after the plant at a cost of about 6d. per ton of tar. The coke breeze for the furnace and the steam are small items on a gas-works. If you have not your own water supply, the cost of water is to be added; and it is important to have a very good supply for the condensers if the best results are to be obtained.

The cost of upkeep has been small. We have had two new cocks and bends to put on, and twice we have had to take off the top of the furnace to make good a joint in the coil.

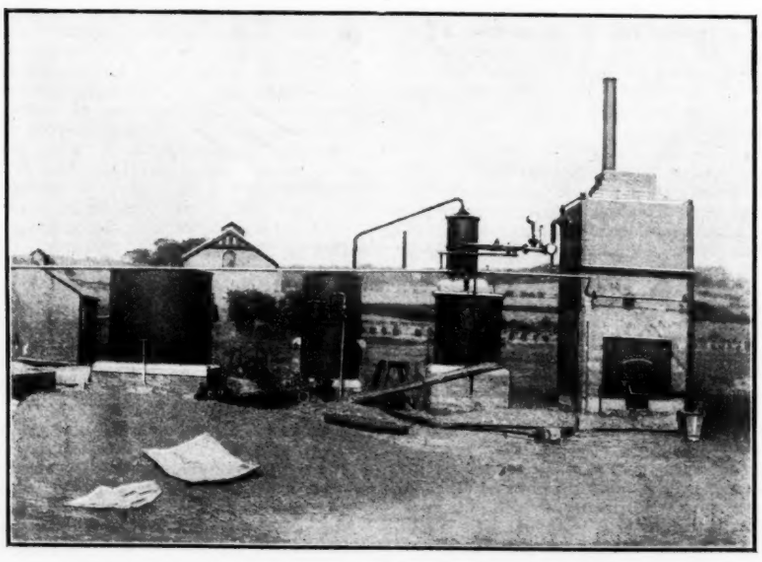
It is necessary to have a large stock of tar barrels, as the delay in returning them is considerable; and a liberal allowance should be made for their replacement, as the damage to them is excessive.

We have three large storage tanks for No. 1 and No. 2 tar and light oil; the tar tanks being fitted with steam-coils to ensure the free running of the tar in cold weather.

The total cost of the plant, including storage tanks and barrels, is about £600 to £800.

It is necessary to have large storage wells for the crude tar, as the market for dehydrated tar in winter is small. We fortunately had the storage; but any works that have only small storage should take this into account.

We have worked up all our tar since last March, and sold it at a satisfactory price; and have besides sold over 30 gallons of light oil per ton of tar. The Corporation are now putting down a tar macadam mixing plant, and so will take a considerable proportion of our make. We are endeavouring to sell all our tar in our gas area; and there must be a large number of medium-sized and small gas-works in the country that can easily do this to advantage. Gas engineers have far too long neglected tar research work; and now that German competition is for evermore done



THE TAR DEHYDRATING AND BENZOLIZING PLANT AT OSSETT.

away with in this country, we shall no doubt give this wonderful substance the attention it deserves, and join together to help to repel the counter-attack. It will be an everlasting disgrace to us if we do not rise to the occasion.

The question will be asked, if we are all going to distil our own tar, what is to become of the large chemical manufacturers? I do not suggest that we should fight against them, but with them. Considering that tar contains over two thousund substances, I suggest that the time has come when we should take our share of the work, and also our share of the profits. There is plenty of work and to spare for all of us.

We used to say that our profits were made in the retort-house; and then we said they were made by pushing the day load. In future, we shall have to add that they are made out of tar; and if we put the three together, and work them to the fullest extent, our gas consumers are bound to benefit by cheaper gas.

The Benzol Plant.

Turning to benzol. Our plant was put down for tar dehydration when we were washing with tar, before we were pressed to wash with oil. But it is also adaptable for debenzolizing the oil. The chief thing to see is that there is a good supply of water for condensing the benzol; otherwise it will escape to the gas purifier and be lost. I am also adding a fractionator filled with Rachig rings, after the vapour box, by which means I hope to get a better quality benzol. I got that to work yesterday; and it certainly has improved the result.

We have a large storage tank for creosote, from which we pump it through the washer. There is stock sufficient for two or three days, so that we are able to use the distillation plant for two days on tar and one on benzol, and thus easily to adapt it for both purposes.

Before we started washing with creosote, we were free from naphthalene; but, unfortunately, the creosote we got contained a high percentage, so we have had considerable trouble in the district. I think the Ministry of Munitions should help us by seeing to it that a good supply of creosote (as nearly free as possible from naphthalene) is available for all. We are spraying naphtha into the gas, to counteract the naphthalene; but this should not be necessary if the cause of the trouble was removed.

We had sufficient apparatus for washing-out ammonia before we gave up part of it for washing for benzol. Now we are short, and consequently are not getting the best ammonia results, which is very unsatisfactory considering that ammonia is also urgently wanted.

No doubt many gas undertakings that have not yet adopted oil-washing are in the same difficulty; and I think a fair solution would be for us to provide the distillation plant and the Ministry of Munitions the necessary washer. Then oil-washing might be made compulsory, and so bring all into line.

We must not stop to ask, Will it pay to put down the plant? or what is going to happen after the war? We must do all we can, and not merely think how we can best help to win. Then after the war we shall not go back to any useless restrictions on gas, but shall treat it as a commercial article to be manufactured and sold at the cheapest price, and shall not be likely to leave in it anything that may be found to be unnecessary and that it will pay better to take out.

I have purposely rambled away from the title of the paper with a view of raising a good discussion, and hope you will not waste time in criticizing the faults of the paper which I know are many, but, considering the extraordinary times we are passing through, will discuss the subject entirely from a patriotic point of view.

Discussion.

The President (Mr. W. Whatmough, of Heywood) said the reason Mr. Mottram had been asked to read his paper was because he had been so successful with his tar. Mr. Mottram's experience suggested it was very desirable that others who were like himself in country districts could sell their tar at a profit if it was treated as he had treated it. In reference to the extraction of the benzol, there were many who had had trouble in districts like Mr. Mottram's; and they would be glad to have the advantage of the experience of such people. They would all be pleased if Mr. Whitehead, of the Ministry of Munitions, who was present, would open the discussion.

Mr. S. E. Whitehead said he wished particularly to state that he was there quite unofficially, and only in his personal capacity, by the invitation of Mr. Frith and Mr. Mottram. The need for benzol for explosive purposes was as great as ever it had been; and he was particularly interested in oil-washing. There had been great difficulty in getting the benzol; and the tar dehydrating plants adopted for oil-washing had stepped in, and to some extent filled a serious gap. Therefore, they were very useful indeed from the national point of view. The chief trouble for the past few weeks lay in the getting of plant. They all knew the difficulty of securing iron and steel, and all other necessary materials for plant; and this made these tar dehydrating plants all the more useful. He understood Mr. Mottram to say that he had obtained very much better results in quality of benzol by having fixed a fractionating column. It was usually better to fix a fractionating column in the manner mentioned by Mr. Mottram. He thought this was, perhaps, the chief technical point to be noticed in connection with these dehydrating plants. The fixing of the fractionating column enabled an engineer to use a great deal more steam than he otherwise could do in order to eliminate naphthalene without greatly reducing the value of the benzol. With regard to the filling of the column, Mr. Mottram had not mentioned what the material was in his case. Mr. Bond had used coarse steel filings obtained from a shell factory for the purpose. This might be an advantage to members contemplating similar arrangements. Mr. Mottram had mentioned that, when letting down the plant after dehydrating, he circulated liquor through the coil, in order to clear the remaining tar out or prevent blocking it. Did he do this after he had done benzolizing; and what precautions did he take to avoid mixing the oil with water? It would be necessary to take precautions to prevent a high percentage of water getting into the oil. He agreed that superheated steam should be used, if possible—particularly when the plant was a good distance from the boilers. Mr. Mottram had sold over 30 gallons of light oil per ton of tar. It would be interesting to know what the composition of the oil was, and the amounts of benzol and toluol it contained—particularly because the author used entirely vertical retorts. When Mr. Mottram said: "We are spraying naphtha into the gas to counteract the naphthalene, but this should not be necessary if the cause of the trouble was removed," he thought that the author rather missed the point. The cause of the trouble in the majority of cases was the extraction of the naphtha. The trouble was not due to the addition of naphthalene to gas, but to the extraction of the naphthalene carriers, which were removed by the process. If suitable temperatures in the water were maintained satisfactorily, the general experience was that no naphthalene was added to the gas by the process. In regard to the suggestion that the Ministry of Munitions should supply the washers, he would not like to offer any opinion. Mr. Frith and others could bear him out in the statement that there was enormous difficulty in getting washers; and if a new washer had to be provided in all cases, it looked as if it would be practically impossible to meet the demand. With regard to naphthalene in creosote, it was almost impossible to adhere to the Ministry of Munitions' specification of a creosote now—especially in regard to naphthalene. Tar distillers were in a very awkward position, and practically could not turn out creosote containing lower than 12 to 15 p.ct. of naphthalene. The only thing that the gas engineers could do was to buy creosote as near as they possibly could to the specification; and he always advised anyone who was putting in benzol plant to buy his creosote immediately he put his tanks in, and allow it time to settle before being used. The creosote was saturated with naphthalene at the time when it was received; and it was better to allow it to settle out any that was carried in suspension.

Mr. H. Townsend (Wakefield) said that, when the Ministry of Munitions called for the extraction of benzol from gas, he interviewed Mr. Mottram, who was extremely generous with his advice and assistance; and he had afterwards adopted a somewhat similar plant, combining the dehydrating of the tar with the extraction of the benzol. He then aimed at selecting a site where the least possible damage would be done in case of accident; and this was a point which he had not previously seen mentioned. Since the disadvantage of the presence of ammonia had been shown in the discussions, he had altered his system somewhat; and now he was going to try and work with the oil the gas which had been deprived practically of all its ammonia. As motor traction had come to stay, the dehydrate coal tar would be a great gain towards keeping the roads in good order. He was pleased to hear Mr. Mottram say he could dispose of all his dehydrated tar in his own district; and he (the speaker) was going to try to do the same, which he considered would be doing a great public service to the community. He would be glad if Mr. Mottram could say whether he had found much disadvantage from the action of the ammonia on the wrought-iron pipes in his apparatus. Another point worth noting was the possibility of using with advantage compressed air for conveying from one point to another in the plant as a more suitable method than a number of pumps. He felt sure that the whole of the work in the dehydrating and benzol recovery processes could be done by this means. He wished to know whether Mr. Mottram worked his plant night and day, or whether it was possible to so arrange the plant that it could be operated in the daytime only.

Mr. L. J. Langford (Stoke-on-Trent) said his authority had taken up the attitude that the Government should bear part of the cost of the plant, seeing that they had so many flat-flame consumers in the district, and that in all probability after the war oil-washing would not be continued. Therefore, the proposal was still "on the table;" and he did not think anything would be done unless the Government made it compulsory. He was going now to Tunbridge Wells; and there one of his first duties would be to put in a plant for the recovery of benzol.

Mr. F. H. Robinson (Harrogate) described his experience with a plant of which he is in charge, and which is working day and night through the winter. He regarded it as essential that the plant should be large enough—say, 50 p.ct. above the maximum requirement. He would like information on the method of testing. The results appeared to be somewhat irregular. A very necessary measure was for the testing to be standardized.

Mr. J. H. Brearley (Longwood) discussed various methods of testing, and also spoke of his experience of the working of a tar dehydrating plant—particularly with reference to the recovery of naphthalene and the complete separation of the naphthalene and benzol by what he called a rough method at present in the experimental stage.

Mr. R. Watson (Doncaster) said they were very much dissatis-

fied with the fact that they had to accept the buyers' method of testing; and he asked Mr. Whitehead for some information on the matter.

Mr. Whitehead said the standard test at present adopted was most unscientific. This was the general opinion; and he knew it was Dr. Colman's strong view. If they adopted a test as a standard which gave higher results, the tar distillers would drop the prices; but the fact remained, nevertheless, that the test was unscientific. He thought they might reasonably hope that something would be done to modernize it.

Mr. G. S. Frith (Runcorn) asked, in working-down after tar dedydrating, what was the loss of ammonia by the washing-out of the plant by the liquor, and what was the temperature when this was usually carried out. Had Mr. Mottram had any difficulty with priming when the pump was affected by the increase in steam pressure? It might interest members to hear that, in laboratory tests, he had obtained a yield of 40·5 gallons of light oils per ton of tar after washing, against the 30 gallons secured by Mr. Mottram's working tests. A very high working result at Runcorn, on Dec. 11, was: Benzene, 7 gallons; toluene, 3·69 gallons. This 10·69 gallons was vouched for by the University certificate. He would like to know what percentage of naphthalene the creosote contained in Mr. Mottram's works. He had experienced trouble with naphthalene for the last two winters, though the gas contained only 3·096 grains per 100 c.ft. in December, 1915, and 2·58 grains in the summer reading. Since then, he had not been able to secure any picric acid. They were just about to start a washing plant. Last September, they gave an order on a priority certificate; and the first two wagons of plant had arrived at the station that day. A Holmes rotary washer had been put down between the purifier and the washing house; and he thought this would be about the best position to guard against fire.

Mr. H. Kendrick (Stretford) said that his concern had not yet started oil-washing. The foundations and buildings were there; but the contractors had to finish some larger plants before they got to his. He wished to refer to the curious results displayed in the certificates of tests issued by the University of Manchester. He heard of a case of a sample being split-up into three parts, and yielding three entirely different results by the University certificates. It was almost impossible to make sense of some of the results; and in certain cases he had taken the liberty of asking Mr. Bond to look into the figures. The suggestions that he had made to the University authorities had not been taken very kindly. As to the naphthalene question, he had been carrying out for about twelve months the suggestions made at the last annual meeting with reference to spraying heavier oils than naphtha into the gas. In the very severe weather of November and December, 1915, they averaged something like 150 naphthalene cases per day, with gas of about 14 candles. In the hard weather of the last month, with gas of only 10 candles, the naphthalene cases, after the spraying with the oil, had only averaged something like 25 per day. The maximum of a day was 31. This showed that the addition of the naphtha to the petroleum in the form of spray had a very considerable effect in reducing the naphthalene. So far as the naphthalene content of the gas itself was concerned, he was not alone in thinking it would be impossible, after oil washing, to eliminate the naphthalene trouble altogether, unless they could strip their gas from naphthalene as well as benzol.

Mr. J. P. Leather (Burnley) said that, in his experience of University tests, he had not found anything like Mr. Kendrick seemed to imply. In every instance of forwarding a sample to the Manchester University, his people had only sent half the sample, and had themselves tested the other half for benzol and toluol. There had been no substantial differences in results, except on one occasion, when he thought the samples must have got crossed accidentally. A noticeable difference was that the University always stated that they got no paraffin figure at all in benzol; whereas their own tests showed that there should be a paraffin element. He would like to know what should be the maximum amount of naphtha in creosote used for oil-washing, to prevent any trouble from naphthalene in the gas. Also, was it possible for him, as a maker of creosote, to produce creosote which could be useful to other gas-works?

Mr. S. Glover (St. Helens) said there was no system of preparing creosote for the purpose in question, except very severe refrigeration. He had already tried to sound a warning note about the use of creosote for washing, and suggested that it would be a means of putting the naphthalene into the gas, and thus become a source of naphthalene trouble. The fact was it did do this; and very unsuitable creosote was being provided by tar distillers, who sold it heavily laden with naphthalene, and so set up the difficulty to which Mr. Mottram had referred. So great had this trouble become, that the National Gas Council had been asked to consider the question, and to suggest to the Ministry of Munitions that, as it was caused by the endeavour to carry out their suggestions, they should suggest a remedy. In a short time a *brochure* would be issued by the Institution giving the experiences of the removal of naphthalene troubles in the district, and summarizing the information given before members at their meetings. There was not the slightest doubt that the creosote sold for washing was a very dangerous and likely source of naphthalene trouble. It was removed very largely by a method of distillation—especially if the method put into effect at Swindon was adopted. There was still a strange misapprehension as to what the gas engineer was doing when he was making his tar. It was supposed to be a reflection against a man that he did not make a tar which had a large content of benzol and toluol; whereas, in point of fact, a man who was making a poor tar might be doing very well indeed in some other way. He was a gas maker in the first instance, and might be doing very well in his gas making, though he was turning out a very poor tar. The tar should be valued to the tar distiller according to its quality; and if it was admitted he had got the best value out of the coal, even though he had a poor tar, it should be said so. Some of them could not possibly get the same price for their tar that others could, because a lot of its value to the tar distiller would have been lost in railway carriage before it reached him. They should try to find out in every district the value of the tar, and endeavour to insist that the distillers who would not give an honest price for it should not have it. He hoped the tar distillers would not get so much of their own way in the future as they had had in the past. In regard to working for ammonia, they were between the "devil and the deep sea." At the same time they had had pressed upon them the urgency of working for toluol and benzol, and the seriousness of the need for the extraction of ammonia besides out of the gas. He was there to ask them not to neglect the recovery of every grain of ammonia that could be got out of it. He could not give them any promise of hope in waiting for the Ministry of Munitions or the Government, or anybody else, for any preference for their plant; but he advised them to recognize fully the seriousness of the work that they had got to do for the country, and themselves procure the plant, as far as they could, to do this important work with. He commended the extraction of every grain of ammonia that they could get, and also the working with oil where necessary, and the preparation of the tar in the very best manner for the utmost value being recovered. Let them not get downhearted if they did not make the same value of tar that somebody else did from the coal that they had treated, because they were after all not tar makers *per se*, but tar makers accidentally.

The President said he would like Mr. Mottram, if he thought it wise to do so, to state the price realized from tar during the last financial year. If he could give the net result of his dehydrating plant, it would be very helpful to others.

Mr. Mottram, replying to the discussion, said Mr. Whitehead had asked whether he washed-out after distilling for benzol with liquor, in the same way as they washed-out after distilling for tar. He did not do so, because he did not think it was necessary. He simply poured the liquor off the top of the tar that was in the tank, through the tank, to clear the tar out, so that it did not settle after it cooled-down and stop-up the plant. He did not think that was necessary after treating the benzol. Mr. Whitehead furnished the scientific reasons as to naphthalene; and he (Mr. Mottram) gave the actual results. He found he had no naphthalene at all to bother him, and very little in the gas before he started washing. Soon after washing, he had hundreds of cases, and they were out in the district. Undoubtedly the creosote that he had got was heavily charged with naphthalene; and the gas took it out in the district. After it had gone through a few times, he distilled the naphthalene out in the way Mr. Whitehead described. The creosote came charged with naphthalene. They put it into the plant, and passed the gas through it; and the gas was bound to take it up and carry it out into the district. Then when the creosote got through into the plant it was treated as Mr. Whitehead had described; but the mischief had been done. He was much obliged for Mr. Whitehead's explanation that they should get the naphthalene out by allowing plenty of time for the creosote to stand and settle before putting it into use in their plant. He was very sorry Mr. Whitehead was not in a position to hold out any hope of help in the way of supplying creosote or a washer. He trusted that the authorities would be equally fair all round. It appeared at present as if they were not going to help the gas industry at all, though they were asking the gas people to get all they could out of every ton of coal. What happened to the ton of coal if it went into the electricity works, from the Government point of view? The bulk of it went in at the gate and out of the top of the chimney; and the authorities got none of the valuable contents of the coal. Nothing was got out of it except a few units of electricity. But what did the Government give these people for destroying coal? While they gave the gas industry nothing, the electricity people came and asked for a sweeping Order to supply electricity all over the countryside in any position they liked, to come into force six months after the termination of the war, and they got it. It was hardly fair to the gas people, who were obtaining all these valuable products out of the coal for them. But he had no doubt they would, nevertheless, continue to do their best; and he hoped the Government would remember this. He would suggest that the time to deal with these sweeping Electric Supply Orders was not now, but after the war, when they could be put into force. In regard to the position of the plant, he had plenty of room, and had put it in a safe place, so far as they could judge. As to washing, he had first tried washing through the tar, but found this was not the most suitable way, and so washed with creosote after they had removed the ammonia. He had not had any trouble yet from ammonia attacking the pipes. In regard to night-and-day work, this was only done when they were busy. They could just as easily work the plant by day only, and often did so because they were short of gas. Mr. Frith had asked how they saved the ammonia after washing-out. All the ammonia which came off the tar in the distilling ran back into the well, so that none was lost in the washing-out. They had not had any priming or any difficulty with the pump. Mr. Frith mentioned getting over 40 gallons of light oil.

He himself spoke of his results as over 30 gallons. Sometimes he got up to 40 gallons, but results varied. The percentage of naphthalene which the creosote contained was very high—about 20. In regard to the question as to the price of tar, he had left this matter out purposely; but he could assure them the price had been very satisfactory. Anybody who was hesitating on the question of price, need not do so any longer. He would do very well, and get very satisfactory figures.

On the motion of Mr. R. E. GIBSON (Liverpool), seconded by Mr. BREARLEY, and supported by Mr. LANGFORD, a vote of thanks was accorded to Mr. Mottram for his paper.

SARDINIAN LIGNITES IN GAS MANUFACTURE.

An abstract of tests on the working scale for the utilization of lignites from the Iglesias mines in Sardinia, carried out by Signor Albert Pacchioni, is published in one of the recent issues of the "Journal des Usines à Gaz," from the full text of the author in the "Bollettino della Associazione Italiana delle Industrie Gas e Acqua." The following is a translation from our French contemporary.

The lignites were those from the Sardinian mines of Bacu-Abis and Caput-Acquas. Analyses made at the Turin Arsenal, the Paris School of Mines, and elsewhere yielded the following results:

—	Turin Arsenal.	Paris School of Mines.	Rossi.	G. Fortez, Lyons	Prof. Sobrero, Turin.
Proximate Analysis—					
Ash	5·85	6	4·8	6·00	6·05
Volatile matter	48·00	50	42·05	55·50	43·95
Carbon	46·15	44	53·15	38·50	50·00
Ultimate Analysis—					
Carbon	59·98	..	70·55	..	..
Hydrogen	4·75	..	5·25	..	..
Oxygen and nitrogen	29·42	..	19·40	..	..
Ash	5·85	..	4·80	..	..

Trials were made by Signor Pacchioni early in 1914, at the San Paolo works in Rome, with lignites from Bacu-Abis. They were of glossy black appearance, showing a conchoidal fracture in some parts and in others fracturing irregularly with numerous planes of cleavage, separated by thin calcareous layers. Superficially they had the appearance of ordinary close-burning coal; but distillation revealed the existence of two distinct components differing widely in properties. One part was formed of hard black brilliant particles, of irregular fracture, altogether similar to ordinary coal. The other consisted of a species of paste of dull opaque colour, of fairly conchoidal fracture, but harder and very compact. In the powdered state, the first specimen was black; the second, brown. The former was found to have the following composition and gas-making properties:

Proximate Analysis.

Moisture	3·02
Volatile matter	38·88
Carbon, non-volatile	40·99
Ash	17·11
Yield of coke, p.ct.	58·10
Yield of gas, c.m. per ton	285
Sulphur, total p.ct.	9·73

Analysis of Gas.

CO_2	7·5
C_nH_m	6·1
O	0·6
CO	16·7
H	34·9
CH_4	28·0
N	6·2

That is, of composition corresponding to a calorific power of 5154 calories.

The customary distillation was done in works furnaces of three inclined retorts, producing 6000 cubic metres per furnace each 24 hours.

The two lateral chambers were charged with small lignite—*i.e.*, that passed by the teeth of an ordinary coke fork; and the middle chamber with selected pieces of lignite, obtained of about the size of ordinary coal by means of a works' crusher. Distillation occupied 36 hours, and the analysis of the coke was as follows:

Lignite Coke.

	From Pieces.		From Small.
Moisture	6·93	..	1·35
Volatile matter	1·39	..	1·93
Carbon, non-volatile	71·72	..	74·32
Ash	19·96	..	22·40

In regard to the possible effect of a mixture with the coal upon the quality of the ash, further tests were made upon two samples—one of black and the other of brown lignite. The results were:

	Black Lignite.		Brown Lignite.
Moisture	3·34	..	1·6
Volatile matter	38·43	..	45·45
Carbon, non-volatile	41·53	..	46·35
Ash	16·70	..	6·60
Yield of coke, p.ct.	58·23	..	52·95
Yield of gas, parts per 1000	250·0	..	320·0
Analysis of Gas.	Black Lignite.		Brown Lignite.
CO_2	9·6	..	5·5
C_nH_m	9·9	..	6·7
O	0·8	..	0·5
CO	14·9	..	14·5
H	32·8	..	35·1
CH_4	27·5	..	33·2
N	4·5	..	4·5
Calorific power per cubic metre	5554	..	5678
Nitrogen in the lignite	1·62	..	3·15
Sulphur in the lignite	9·82	..	7·84
Sulphur in the coke	7·45	..	5·62
Whence sulphur in the gas	5·49	..	4·86
And sulphur in the coke	4·33	..	2·98

Analyses of the ash have shown it to be composed largely of silica, lime, and iron—chiefly the last-named. A comparison of the lignite ash with that of English and German coal is given in the following table:

	Coals.		
	Bacu-Abis.	English.	German.
Silicon	11·45 ..	50 to 60 ..	27 to 31
Aluminium	6·25 ..	30 to 25 ..	22 to 8
Lime and magnesia	20·12 ..	15 to 8 ..	27 to 5
Oxide of iron	49·05 ..	4 to 6 ..	24 to 54
Phosphoric acid, sulphur, &c.	13·13 ..	1 ..	Traces.

On the other hand, in distilling on the laboratory scale the two samples given in the above table, in admixture with black and brown lignite, the latter yielded a dull amorphous powder, while the other gave good coke in small pieces, of silvery appearance and of light and coherent quality. As this sample corresponds with a quality having a high percentage of ash, it is possible that the partial agglomeration during distillation on the working scale is due to the nature of the ash; but unfortunately the laboratory has not been able to make the analyses necessary to settle this question.

The author points out that the higher the proportion of oxygen in the coal, the greater the yield of volatile matter and the smaller the yield of coke; a proportion of oxygen greater than 10 p.ct. and below 4 p.ct. yielding a bad coke or none at all. It would thus appear that the black and brilliant component of the lignite contains oxygen to the amount of (or somewhat below) 10 p.ct.; while the other (opaque) component, yielding a brown powder, has a larger proportion of oxygen. It is, in fact, found to yield more volatile matter and a larger quantity of gas than the other. The author's conclusion, however, is that the coke obtained in the distillation of these natural lignites is not of commercial value, and that the most rational use of it is for the production of an enriching gas or, as opportunity offers, for the production of Siemens gas in a producer. In distillation, it is best to use it in admixture with ordinary coal; both fuels requiring to be reduced to pieces about the size of a small pea, in order to ensure their adequate mixture. Experiments were made on the industrial scale with mixtures of 25, 30, and 35 p.ct. of lignite, and yielded the following results:

—	Lignite in the Mixture.			
	25 p.ct.	30 p.ct.	35 p.ct.	Coke.
Moisture	3·36	2·61	0·70	1·25
Volatile matter	1·11	3·89	0·85	2·04
Carbon, non-volatile	84·92	81·51	85·20	85·28
Ash	10·61	11·99	13·25	11·43

The distillation of Caput-Acquas lignites has yielded results as follows:

	Gas Unpurified.		Gas Purified on Works' Scale.
CO_2	11·5	..	—
C_nH_m	7·0	..	8·3
O	0·1	..	0·1
CO	12·9	..	14·8
H	27·5	..	31·7
CH_4	38·1	..	42·2
N	2·9	..	2·9
	100·0	..	100·0
Net calorific power, at 760 mm., by analysis	5585	..	6405
Calorific power measured by Junkers calorimeter: gross	6192	..	6985
Calorific power measured by Junkers calorimeter: net	5592	..	6395
Density of gas	0·69	..	—

The general conclusions reached by the author are as follows.

1.—The lignites analyzed yielded ash containing much sulphur—in quantity, greater than other lignites.

2.—Bacu-Abis lignite consists of two parts—one rich in volatile matter and sulphur, and the other with a high content of ash but with less nitrogen and with little tendency to aglomerate.

3.—Coke from Bacu-Abis lignite, as regards both appearance and size, is not of commercial value.
4.—Coke comparable with that obtained from ordinary coal can be made from a mixture of 35 p.ct. lignite and 60 p.ct. coal so long as the lignite is freshly crushed small and well mixed with the coal.
5.—Such mixtures, although they give rise to some swelling of the charge in the retorts to an extent that the upper layer of coke reaches the crown of the retort, do not appear to offer insuperable difficulties in distillation.
6.—In the use of Caput-Acquas lignite, coke can be got in small pieces of light spongy quality, of silvery appearance, but more fragile than that from ordinary coal.
7.—The gas obtained from both Bacu-Abis and Caput-Acquas lignite, when purified, is entirely comparable, in quality and quantity, with that from the English coals.
8.—The high content of nitrogen in the Sardinian lignites renders it likely that, by suitable distillation, a higher yield of ammonium sulphate could be obtained, together with an excellent heating gas.

Caput Acquas Lignites.

Sample of black colour, brilliant surface, hard, with irregular conchoidal fracture. Specific gravity, 1·3690. Calorific power, by Thomson's method, 6950 calories. Analysis:

	Natural State.		Dried.
Moisture	2·22	..	—
Ash	13·09	..	13·38
Volatile matter	42·29	..	43·27
Carbon, non-volatile	42·40	..	43·35
Yield of coke	55·49	..	56·73

At 900° C. dry distillation yielded 247 c.m. of gas at 0° C. and 760 mm.

Composition of the Gas.

	Unpurified.		Purified.
CO_2	11·5	..	—
C_nH_m	7·0	..	8·3
O	0·1	..	0·1
CO	12·9	..	14·8
H	27·5	..	31·7
CH_4	38·1	..	42·2
N	2·9	..	2·9

Calorific power corrected to 0° C. and 760 mm.

Net, calculated from analysis		5585	..	6405
Measured by Junkers calorimeter	gross	6192	..	6985
	net	5592	..	6385
Density of gas		0·69	..	—

This gas is rich in hydrocarbons, and, after removal of the carbon dioxide by lime, can be mixed with coal gas. Its high content of non-saturated hydrocarbon is shown by its great calorific power, which is higher than that of gas from many species of ordinary coal.

A determination was made of the benzol separated from the gas by cooling to 22° C. The figure obtained was 13·19 grams per cubic metre. Adding the constant (23·50 grams) for the quantity of benzol retained in the gas at this temperature, the total is 36·69 grams per cubic metre. Thorough washing of the gas allows of 90 p.ct. of the benzol being recovered; and thus the Caput-Acquas lignites yield 8·18 kilos of benzol and homologues per ton distilled—a quantity comparable with that obtained in the distillation of coals of good quality. The worse fault of this lignite is its 8·23 p.ct. of sulphur—an enormous figure for a coal to be used for gas making.

Signor Donadio has expressed the opinion that in a suitably designed plant 15 p.ct. of lignite could be distilled without trouble. As regards exceeding this proportion, however, he dismisses the suggestion of providing an increased area in the purifiers, on the ground of cost, and suggests two alternative methods for the removal of the sulphur. One is to mix the lignite with 10 p.ct. of oxide of iron; the other is to wash the gas in a coke tower with a solution of sulphurous acid. In the former process, the sulphur is retained as sulphide of iron; in the latter, the hydrogen sulphide and sulphurous acid mutually decompose each other, with deposition of sulphur. By the use of oxide of iron in the Inglesias works, it has been possible to distil 50 p.ct. of lignite, obtaining a gas which is better than that yielded by a 20 p.ct. mixture of lignite without the oxide. The coke is of inferior quality, but not to such an extent that it cannot be sold: The iron sulphide passes into the dust.

The second process, although more attractive, is of no service to works of small or medium size, inasmuch as it calls for the regular control by a chemist of the scrubber, pump, filter-presses, &c., and requires plant the cost of which is greater than that of purifying chambers constructed of (say) reinforced cement.

The Caput-Acquas lignite yields a coke in good pieces, of fine grain, light quality, and silvery appearance, which burns easily but is friable. The approximate yield is 57 p.ct.; the percentage composition of the coke being as follows: Moisture, 5·05; ash, 25·58; carbon, non-volatile, 67·72; volatile matter, 1·65; equivalent to the following composition of the dried coke: Ash, 26·95 p.ct.; carbon, non-volatile, 71·32 p.ct.; volatile matter, 1·73 p.ct.

The Scottish Junior Gas Association (Eastern District) are arranging for a joint visit with the Western District to the Falkirk Gas-Works next Saturday.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Prof. Armstrong at the South Suburban Gas Company's Meeting.

Sir,—With reference to the report of the South Suburban Gas Company's meeting, which you published in your issue of Feb. 27, as it was not open to me to reply to the remarks made by the Deputy-Chairman, I beg you will allow me to express my thanks to him for the manner in which he assisted in bringing my contention into prominence. I neither intended nor made an attack upon the Directors, whose qualifications I am able to appreciate probably as well as is Sir Fortescue Flannery.

What I did was to point out the novel issues likely to arise in the near future in the gas industry, and the need of expert electrical and chemical assistance to deal with them. My argument would hold equally if the South Suburban Board were composed entirely of eminent gas engineers. Gas undertakings are behind the times because, hitherto, directors have neglected both the chemical and the electrical relationships of the industry. No better illustration of inability to appreciate these issues could be asked for than was given by Sir Fortescue Flannery's patent failure to understand the bearing of my remarks.

While I would thank the Chairman for the courtesy with which he received my remarks, I may point out to Sir Fortescue that if persons like myself "go about," they are probably not unequipped; but are rather to be regarded as moving with some sense of duty, and taken seriously. To mount on stilts, and ride the high moral horse, is not the way to counter them, but merely a sign of weakness and misunderstanding of the director's function.

Henry E. Armstrong.

55, *Granville Park, Lewisham,*
March 3, 1917.

Candle Power and Calorific Values.

Sir,—Referring to your comments on my letter published in the last issue of the "Journal," but more particularly to the last few lines, where you call my attention to some tables in Mr. W. G. Adam's very able contribution on "Oil-Washing for Benzol and Toluol," I regret if in my desire to abbreviate an otherwise somewhat lengthy communication I omitted to make myself properly understood.

My remark that "even to-day there is a large number of men who believe that the candle power is no indication of the calorific value of a town's gas, whereas the records of the London County Council testings show conclusively that such an impression is wrong"—in my view holds good.

I was at the time of writing conscious of the factors to which you draw my attention in Mr. Adam's contribution. Mr. Adam's figures relate to the gas after abnormal treatment, and are intended to illustrate the fact that, while the illuminants are more or less totally eliminated by the process of washing, the heat value of the gas is affected in a much smaller ratio—generally found to be only 5 p.ct.

Under normal conditions of gas manufacture, of the total volume of gas not more than 4 to 5 p.ct. represents illuminating matter, and so long as this is left in the bulk, candles and calories bear a close but not definite relationship. If, however, this small percentage of illuminants is extracted, as is the case when benzol extraction is practised, the remaining 95 p.ct. is in no way affected; and it still retains its own calorific degree.

Obviously, if the illuminants are first extracted as far as is commercially practicable, and then the candle value of the remainder is ascertained, we are dealing with a gas of an entirely different character; and the results cannot be compared with former times. But when we are speaking of pre-war times and normal conditions of manufacture, and say that x candle gas will be equal to x calorific value, the relationship is very uniform. All this is presupposing that we are dealing with a normally produced coal gas or carburetted water gas. When, however, we deal with an artificially attenuated gas produced either by over-exhaustion or diluted with blue water gas, or from which the illuminants have been extracted by any of the washing processes, it is possible to completely eliminate or nullify the effects of the illuminating gases without in any way disturbing the calorific value of the true gases remaining.

My conclusions are based on the County Council figures of 1909 to 1914, before the introduction of washing, and before the various means now employed to greatly increase the yield of gas per ton were introduced; and the particular point in my mind was a comparative table of the "calorific value of the gas in the few works where calorimeters existed (say) in 1910, prior to the introduction of the standard burner," and the calorific value subsequently supplied and as supplied to-day. I do not suggest that a 14-candle normally produced coal gas in one locality yielded by one class of coal will necessarily be the same as a similar candle gas produced from different coal in another locality and perhaps under different conditions; but I do not think it can be denied that, as the candle value has been reduced since the introduction of the No. 2 burner, the calorific value has come down with it.

If there is still any doubt, I can only suggest placing in your hands for publication my summaries of the County Council figures relating to the three London Gas Companies, which are summaries in diagrammatic form, and seem to me to conclusively establish my point of view.

W. R. Herring.

Palace Chambers, Westminster, S.W.,
March 1, 1917.

[No one can now avoid properly interpreting Mr. Herring's contention after this explicit communication, which shows conclusively that our correspondent's original statement is fenced round with qualifications, which altogether deprive it of any claim to a definite relation-

ship existing between candle power and calorific value. The impression is wrong (positively declared Mr. Herring in the sentence upon which we fastened last week) that "the candle power is *no* indication of the calorific value of a town's gas." This is such a clear-cut statement that anyone could well have been pardoned for imagining that Mr. Herring intended it might almost be accepted as a principle that the candle power of a gas does give an indication of its calorific value. But he does not include gas which has had part or the whole of its illuminants violently extracted without affecting but infinitesimally its calorific value. It must be a normally produced gas, and not one artificially attenuated. And in considering what is meant by a normally produced gas, our correspondent desires his readers to note that he does not suggest that a 14-candle normally produced coal gas in one locality, yielded by one class of coal, will necessarily be the same as a similar candle gas produced from a different coal in another locality, and perhaps under different conditions. Verily, there does not seem to be much left to support the assertion that the impression is wrong that the candle power is no indication of the calorific value. It seems only a logical conclusion that, if candle power is an indicator of the calorific value of a gas, then the more stable calorific value of a gas should be an indicator of the candle power. But it is not. When one can practically strip a gas of illuminating power and leave the calorific value little affected (which shows how minor a part the illuminants have in the making of the total calorific value), the great distance of the relationship between the one quality and the other is accentuated; and it is difficult to accept the one quality under even normal conditions as a safe criterion of the other quality. However, the qualifications which indicate the limited application that Mr. Herring intended his definite assertion to have, show that he is closer to the belief of "the large number of men" to whom he referred than last week we fancied him to be.—Ed. G.J.]

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 28.]

Nos. 2399—2760.

Adams, H. E. F. Goold-.—"Purifying gases." No. 2744.
Adams, H. E. F. Goold-.—"Mixing compressed gases in definite proportions." No. 2745.
Adams, H. E. F. Goold-.—"Oxidation of ammonia." No. 2748.
Campbell, A.—"Gas-burners." No. 2666.
Girling, W. H.—"Fire-brick linings, arches, &c., for furnaces." No. 2634.
Greenwood, H. C.—See Adams. Nos. 2744, 2745.
Hall, I.—"Furnaces, &c." Nos. 2483, 2484.
Hall, I.—"Melting and casting metals." No. 2673.
Heyl, G. E.—"Distillation of coal." No. 2630.
Hodgson, J. L.—"Fluid meters." No. 2409.
Mondolfo, G.—"Transforming peat into a combustible product." No. 2622.
Partington, J. R.—See Adams. No. 2748.
Rideal, E. K.—See Adams. No. 2748.
Williams, E.—See Girling. No. 2634.

PARLIAMENTARY INTELLIGENCE.

Lighting of London.

Mr. Lough asked the Home Secretary whether he could explain why the lighting of London had not yet been made uniform, in accordance with the orders of the military authorities; whether he was aware that in some boroughs burners were in use consuming 3½ c.ft. of gas per hour in lamps which were almost completely opaque; and whether he would consider, in order to give a reasonable light and at the same time save gas, if it would be more advantageous for the lower part of the lamp to be clear, but with a smaller burner.

Sir G. Cave replied that the alterations in the method of obscuring street-lamps to which he had referred on a previous occasion were being carried out by the lighting authorities as rapidly as the exigencies of labour would permit; but there were some lamps still remaining to be dealt with. A considerable reduction in the consumption of gas had been effected by the use of single burners in multiple-burner lamps and by substituting lower-power burners for those normally employed. If the lower part of a lamp was left clear, the result was to throw a disc of light upon the pavement which was visible from above; and he was advised that, taking all things into consideration, the method of obscuring which had been approved was the most satisfactory.

Fuel Research Committee.

Mr. Boland asked the President of the Board of Trade whether the newly-appointed Fuel Research Committee proposed to investigate the utilization of the peat resources of Ireland, and in particular that method of producing suction gas and obtaining valuable bye-products which had been used in a factory at Portadown.

Mr. Fisher (the President of the Board of Education) said, in answer, that the terms of reference to the Board of Fuel Research covered all forms of fuel; but it was obvious that, with the present shortage of man-power, they would be compelled to devote their attention, in the first instance, to the problems of coal utilization.

State Control of Coal Mines.

Mr. Duncan Millar asked the President of the Board of Trade last Wednesday whether he was yet in a position to make any statement as to the financial and other arrangements which had been completed in connection with the transfer of the coal mines in the United Kingdom to the State and their control by the Controller of Mines, and as to the position and rate of pay of the miners under the new scheme.

Mr. Roberts, in reply, said he was not now able to add anything to the answer he had already given [*ante*, p. 414]. The Controller was hard at work on the subject; and he (Mr. Roberts) was anxious to make a statement as soon as practicable.

LEGAL INTELLIGENCE.

SEIZURES OF INCANDESCENT MANTLES.

On Monday of last week, in the King's Bench Division of the High Court of Justice, Mr. Justice Darling and a Special Jury had before them the question of the seizure of imported incandescent mantles.

Attorney General v. B. Frank.

The Attorney General (Sir F. E. Smith, K.C., M.P.), the Solicitor General (Sir Gordon Hewart, K.C., M.P.), and Mr. H. M. Giveen, appeared for the Crown; Mr. Elkin represented the defendant.

Mr. Elkin asked for an adjournment of the case, as material witnesses for the defence had not arrived from Holland.

His Lordship declined to postpone the hearing.

Mr. Elkin remarked that, in this case, he had no instructions to defend.

The Solicitor General said it was an information claiming the forfeiture of fourteen cases of incandescent gas-mantles seized, after information to this country, on the ground that they were of enemy origin. The information was laid under section 6 of the Customs (War Powers) Act, 1915, which said that, where the Commission of Customs and Excise have reason to suspect that the country of origin of any goods imported is an enemy country within the meaning of the preceding sections, goods may be seized; and in any proceedings for the forfeiture and condemnation thereof, the country of origin shall be deemed to be such enemy country, unless the contrary is proved. All that was necessary for the Crown to do was to satisfy the Court that the steps had been taken which the law required in respect of the seizure of the goods. There were three distinct consignments of goods; the consignors in each case being a firm called the Gasloailicht Fabrik Monopol of Amsterdam, the proprietor of which was a Mr. B. Frank. The mantles were seized on the ground that the country of origin from which they came was believed to be an enemy country. Samples from the various cases were sent to the Home Office, and submitted to experts; and on their reports the whole of the consignments were seized. Apparently, before the war the export of these goods from Germany to this country was about four times as large as the import of similar goods from Holland. Then came the war; and in theory export from Germany stopped. In fact, what happened was that the exports from Holland were forthwith multiplied by more than three. As to these particular mantles, there were two points which made it quite plain in the submission of the Crown that they were of German origin. The first was that the fabric was German; and the second was that it was a physical impossibility for the owner of this factory, with his plant and staff, to turn out the quantity of goods he said he had.

The Jury, after hearing evidence, returned a verdict for the Crown, and judgment was entered accordingly, with costs.

Attorney-General v. Van der Schuyt and Others.

The Solicitor General (with Mr. Giveen), for the Crown, said in this case the Crown claimed, under the same section, forfeiture of twenty cases of mantles which were landed from a Dutch steamer. The consignors were described as A. B. Van der Schuyt. Notice of the seizure was given to both consignors and consignees; and the consignors made a claim to the goods, on the ground that the property remained in them, as they were not to be paid for until delivery. Agreed samples were taken, for the purpose of being tested, and upon examination by experts were found to be undoubtedly of German manufacture. There was no appearance for defendants.

The Jury found for the Crown, for whom judgment was entered, with costs.

Northwich Gas Company.—The Chairman, in moving the adoption of the report and balance-sheet at the annual meeting of the Company, said that, taking into consideration the abnormal times, shareholders were to be congratulated on the excellent statement. The revenue account showed increases in receipts of £1539, and in expenditure of £2020—the latter being due to heavy rises in rates and taxes, wages, and raw materials. The profit for the year was £3384; and dividends were recommended at the rate of 4½ p.ct. (less tax) on the ordinary shares and 4 p.ct. (free of tax) on the preference shares. A sum of £250 was transferred from revenue account towards the cost of the new Gas Act, leaving a carry-forward of £324. The gas sold showed an increase of 1½ p.ct. on the previous year's figures, with a decrease of 2½ p.ct. on the quantity made. The Manager (Mr. J. A. Brentnall) and staff were complimented on the excellence of the year's work.

MISCELLANEOUS NEWS.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Tuesday at the Cannon Street Hotel, E.C.—Mr. H. E. Jones in the chair.

The Secretary (Mr. Charles W. Braine) read the notice convening the meeting, and the Directors' report and the accounts were taken as read.

Shipping Coal and its Contingencies.

The Chairman, in moving the adoption of the report and accounts, said, although they met again under the shadow of a great war, he thought the proprietors might congratulate themselves that, in spite of the hardships that kept on surrounding them, and made the course of business more difficult and more expensive, they had a report and statement of accounts which allowed of the payment of the statutory dividends. The report told them that there was a profit sufficient, after taking £5200 from the special purposes fund, to admit of the dividends being declared. The £5200 was the core of the whole thing; and it was necessary for him to explain under what circumstances the call was being made on the fund. The circumstances were simply these: It would be remembered that he had told them over and over again that a great advantage enjoyed by the Company was the possession of its own shipping, in which it was a pioneer so far as going up the river through the bridges was concerned, although the real pioneer among gas companies carrying their own coal was the Commercial Gas Company. He had the pleasure of introducing the system of ship ownership into that Company some 25 years ago; and it had been its rock of salvation. That it was a sound proposition was evidenced by the fact, which many present would know who were stockholders in other large gas companies, that there was hardly a gas company now of any magnitude bringing coal by sea to London from Newcastle which had not, either directly or indirectly, some control over the vessels used. The reason for this was that since the war broke out, shipping had been so scarce owing to the great demand of the Admiralty, and had been so dear owing to the war profit ideas of shipowners with, after paying the usual excess profits, their 25 to 30 p ct. dividends, which were enough to make the mouths water of shareholders in less profit-making concerns. To get rid of these difficulties had driven the bulk of the important gas undertakings—at any rate, in this part of the world—into purchasing ships for their own service; but this had not been done except at a high cost. The *Mitcham*, unfortunately—sadly so to their Chairman, who went to look at her on the shore at Sheringham one Sunday afternoon in the autumn—got so far inshore that she found herself suddenly fixed. It might be said by some of the proprietors, "Well what business had she to be so far inshore?" The conditions under which boats, even small ones, travelled now with safety between the Tyne and the Thames, involved their keeping in the shallower waters. Though this occurrence was unfortunate and regrettable, they could not find the men blameworthy. They carried their lives in their hands; and they suffered more than anyone by a disaster of the sort. Therefore they could not blame them for want of care; they must praise them. The proprietors knew the story of their own brave little boat that engaged a submarine, and was a pioneer in being the first merchant vessel (all such vessels were being armed now), though only a humble collier, that carried a gun and "downed" a submarine. In his statement to the House of Commons the other day, Sir Edward Carson said that in submarine warfare, when a boat went down, they did not absolutely know whether she was sunk or whether she was simply dodging. At any rate, whichever thing happened, they got rid of her. When the *Mitcham* went ashore, she was fixed, before the tides came up; and when she could be got off, she was towed away to a dry dock to be repaired, which process, which ought to have taken ten days, took two months—simply because they could not get the work done without an Admiralty permit. Admiralty work came first. The loss—not of the vessel, for she was fully insured, and whatever injury she suffered the insurance office paid for, but of her services—dispossessed the Company of 14,000 tons of coal (which was her share of the burden during that period), and this 14,000 tons had to be provided outside. Beyond this, there was a further amount of 22,000 to 23,000 tons to be furnished from outside, because, owing to the Admiralty restrictions, ships that ought to carry comfortably 60 to 64 freights a year were lucky if they managed 38 or 40 freights. When they bought the *Ewell*—the last boat acquired—they reckoned to be competent to bring, in the aggregate, 20 p.ct. more coal than they wanted—in fact, so much did they reckon upon this that they made arrangements with two small gas companies to share some of the expense and some of the service. But instead of the surplus, their ships brought them something like 40 p.ct. under what he might call the ideal quantity. This was felt to be something which could well go to the special purposes fund, which was to provide for things of this sort. But he could tell the proprietors frankly that, owing to circumstances which he should disclose on reaching the figures, it would not have been possible to give the proprietors the statutory dividend unless they had availed themselves of that fund.

An Increase and a Super Increase.

In the midst of these conditions it was satisfactory to see that the sale of gas had increased by nearly 4 p.ct.; and this was rather a high rate, seeing that the rate of increase in the case of the two largest London Companies was about 1 to 1½ p.ct. But this increase was nothing compared with what came upon them after the half year was over. When the cold snap of weather came, they had a 50 p.ct. increase of consumption in part of their district—at the farther end at Epsom; and 26 to 30 p.ct. from day to day was the actual increase taken from them over the area of Wandsworth, Wimbledon, and Mitcham. If the Company had had the means, they could have supplied another 25 p.ct. over what they were doing. This great extra demand was simply due to those consumers who had been, to the Company's great gratification, having stoves supplied to them over the last three or four years at an abnormal rate. Whether they were prudent, providential, or prophetic he could not say; but, at any rate, it seemed as though they must have foreseen the day when coal would not be readily obtained, and, as soon as the sharp weather set in, they turned on their gas-tap, instead of having coal carted in, which, in fact, became impossible owing to the shortage of men. Ordinarily, with such a growth of business, the Company would have been delighted; but what were the conditions since the war broke out? Capital had been denied to trading companies like theirs, men had gone into the Army, and materials could not be obtained. Even if they could have foreseen this great increase, they could not have provided for it; but he was glad to say that, by the efforts of their Engineer (Mr. H. O. Carr), who nearly wore himself out, they succeeded in giving this large additional supply. For over five weeks, after the peak of the Christmas load had passed, they were sending out nearly one-eighth more gas than before. He referred to this, though not included in the accounts, to give the proprietors some idea of the hardships they had had to face under these extraordinary conditions.

Capital Expenditure and Transport.

Coming now to the accounts, the expenditure on capital during the half year was £21,500. As the gas consumption had increased nearly 4 p.ct., the proprietors would see, if the Directors had spent £40,000, it would have been only about the right proportion. But they succeeded in spending only £21,500; and a great deal of this was expended in meeting national needs. The plant had only really been added to in connection with the work of serving the Explosives Supplies Department of the Ministry of Munitions. Mains, services, meters, and stoves were comparatively small matters. There was one humble figure of £640 for a motor. He thought the proprietors would like to know that, besides possessing their own ships, the Company had a very fine derrick floating in the Thames; and it had a most extraordinary fleet of transport vessels. It had 3850 tons of barges; it had 33 motors of various sorts, 13 of which were driven by steam raised by coke—another hobby of the Directors—and which were each capable of carrying 12 tons of coal or coke each. In addition, they had four 3-ton coke transport steam vessels; and they had about one dozen petrol motors, for the purpose of taking over the Company's very large district (which had an area of some 47 square miles) the stoves, meters, and fittings for which people were constantly asking, for bringing others in for repair, and for the work of the Company generally. There were also four or five staff cars in which the Engineer and the inspectors were constantly running about the district. This, he thought, was a record to remember when companies were talking about their capital accounts. Their capital account was a low one; and yet there was not another company in England of equal size that had ships, derrick, steam wagons, and the other means of transport on anything like the same scale as their Company had. When the proprietors looked at their capital account, they might be sure that they had a great deal more than the average gas company had got for it, and this independently of their large proportion of coin meters, fittings, and other appliances.

Manufacturing Materials and Residuals.

Going to the revenue account, he must tell the proprietors that coal and other gas-making material had cost in these accounts some £37,300 more than in the same period of the previous year. Remembering that to pay the statutory dividend required about £30,000, it would be seen that coal and other raw materials had in extra cost "mopped up" alone more than enough to meet the dividends. Fortunately £17,900 came off that for the advance in the value of residuals—chiefly coke, because tar and ammonia were the matters that the service of the country demanded; and the powers that be were careful to see that they did not get anything extra out of them—they were practically commandeered at the old prices. This, after accounting for all residual values, left them with a deficit on coal and other manufacturing material of £19,400. He thought the proprietors would see that there must have been considerable economy and attention given to the Company's affairs to show a profit of £26,987, which was only less by £11,800 than in the corresponding period of 1915, in spite of the fact that coal cost them a net increase of £19,400.

Employees' Bonus and War Expenses.

A feature of the accounts, which was of some interest, was that the profit-sharing amounted to £2300 for the half year. This was divided among 827 employees, who each held about £22 of the Company's stock. Another feature of the accounts which, it would be observed, added considerably to the burdens of the undertaking, was the amount of £2015 paid to dependants of their employees on active service, and the food bonus of £9912, which food bonus was £5500 more than in the corresponding half year. These payments together came to nearly £12,000, which figure represented about 2½d. per 1000 c.ft. of gas.

Comparison of Coal Freights.

One word about the difference in the cost of employing outside ships compared with their own. They carried two-thirds of the coal required in their own vessels at a cost of 7s. 4½d. per ton—including the costs due to the *Mitcham* being laid aside for two months (when most of her charges and depreciation were going on)—while outside ships cost them 13s. 6d. per ton for the same service. Only the previous week, they were prepared to pay 16s. 6d. for an outside ship, because they had been running out of coal very rapidly, and there were arrears from two collieries. But the 16s. 6d. was not listened to; and the boat had been taken for some other duty. That day it was not altogether a question of the rate of freight, but whether they could get a ship at all to carry their coal, because the shipowners knew that, owing to the Admiralty restrictions, their ships could not give them so much return as would otherwise be the case. The Directors would have been very glad to pay the 16s. 6d.; and if they had been able to do so, the difference between that and the cost of 6s. 3d. (apart from the *Mitcham*) by their own vessels would have been 10s. 3d. per ton of coal carried by that ship. If the proprietors wanted to know what this meant with regard to the burdens upon the undertaking, they might reckon that 10s. per

ton represented roughly 10d. per 1000 c.ft. on the cost. With these facts within his knowledge, he could not allow the proprietors to leave the room that day with the impression that the magnificent dividend they were going to receive would be repeated in the current half year nor in the succeeding one, unless the disastrous shadow of war passed away from them.

The Deputy-Chairman (Mr. R. Garraway Rice) seconded the motion.

Mr. George Ennis remarked that he noticed the expenditure on land amounted to £2000 odd; and he asked if the Chairman could conveniently give them in acres some idea of what the land consisted. The report he regarded as most satisfactory. Every member of the staff seemed to have done his best. In regard to the loss on the *Mitcham*, the allocation made in respect of this was perfectly fair and reasonable.

Alderman Porter thought that all in the Company's service—from the Chairman, through Mr. Carr and Mr. Braine, down to the smallest office boy—deserved thanks from the proprietors for their part in producing the present accounts. There was only one thing to which he wished to refer; and it was that the Chairman should in his reply say something to encourage the good feeling of the people who had been complaining.

The Chairman: We had not enough gas for them during the severe weather.

Alderman Porter said he knew that, and that the supply had been of indifferent quality. But he knew also that this was not the fault of the Company. The Directors and the officers had had much with which to contend; and if those who had complained had sensible heads, they would sympathize instead of complaining.

Sir J. Fortescue Flannery, Bart., M.P., also congratulated the Board and the officers upon the results. The point that struck him most was the Chairman's explanation regarding the extra consumption during the cold weather. Undoubtedly this was an experience that had been shared by all gas companies, and by none, apparently, more than by the Company. This he thought was a matter for congratulation. When the Chairman warned them that they must not look with certainty for similar good dividends in, perhaps, the next one or two half years—at any rate, so long as the war lasted there would be difficulty of this kind—he thought there was this to be taken as a comfort, that those who had, under the stress of the cold weather, gone from coal-burning to gas-burning for heating would appreciate, in a very permanent way, the benefit, and the Company would in future find its consumption was very favourably affected by the education that the people had had forced upon them during the cold weather. There was another very good point of comfort and encouragement for the ultimate future. This was found in the unusually large plant for mechanical transport, both on sea and land, which the Company possessed. When peace was declared the Company would derive great advantage from this transport. At the present time many gas companies were driven to obtain their coal by rail to an extent that had never obtained before; and possibly this Company would be driven in the same way by the stress of circumstances at sea. But when the time came when they could select their transport to suit their service, the very large plant the Company possessed would be of permanent advantage. He congratulated the Company, too, upon their co-partnership scheme. To his mind, co-partnership was a means of salvation not only to the gas industry, but to the whole country, in respect of the composure of the difficulties as between capital and labour. In his opinion the gas industry was the pioneer of the greatest social reform that this generation had witnessed. To his mind, the reform would extend, and would be the means of setting-up a common interest and a common objective between working men and those who had the capital to secure them the means of employment. He was glad the Company had taken so strong a position in the matter; and he was confident, in the hands of the Chairman and his colleagues, the movement would be encouraged and increased.

The Chairman, answering Mr. Ennis, said there was not much land in the £2200. It would be remembered that the Company's site was a large one, and was intersected by certain by-ways and streets, which were ultimately to be closed, and which contained the dwellings of working people. They had acquired some of them in the half year. They did not do this out of pure benevolence; but in order to accommodate the benzol-refining plant. There would perhaps be more changes in respect of the remaining property when it became necessary to deal with it. In connection with this, the Company were under an obligation (which had not been pressed against them lately by the local authority) to build for rehousing purposes. But inasmuch as there were so many empty houses in the district, they had not been asked to do so. The land did not represent a large area; but it was of great value to the Company. As to Alderman Porter's remarks, when consumers suddenly wanted an unprecedented supply, and more than in current circumstances the Company were able to afford, there was bound to be a shortage on the extremities of the district. They bought costly materials, and did all that was possible to meet the demand. Sir Fortescue Flannery had mentioned the conveyance of coal by rail. The Company were already again using the railway at Mitcham. In ordinary times they saved 3s. a ton by bringing the coal for Mitcham by ship, and sending it through Wandsworth to the Mitcham works. At the present time, shipping costs had reversed the position; and although they could not get much of the coal through Mitcham by rail for the other stations, they were doing what they could, and the wagon question became important. In their need for coal by railway which could not easily be got, the South Suburban Company (of which Sir Fortescue Flannery was a Director) were so good as to divert from their own supplies 1000 tons of coal. In the "Thomas Hawksley Lecture" which he delivered at the Institution of Mechanical Engineers, he spoke of the enormous facility that gaseous fuel possessed in distribution, especially to the residents in rural districts, where the working man might be four or five miles from a railway station, and would find it difficult to obtain coal in small quantities. Gas undertakings wanted the fuel business; and no doubt they would get it. But they did not want it all at once. In 1902, he advocated the production of fuel gas; but at the time the proposal was not received with any warmth. Still, he thought the time would come when they would be supplying fuel gas generally. But it was a matter that must be approached gradually.

The motion was unanimously carried.

The Dividends.

Moved by the Chairman, and seconded by the Deputy-Chairman, the dividends were declared at the statutory rates per cent. per annum, less income-tax, as follows: On the Wandsworth "A" stock, £8; on the Wandsworth "B" stock, £6 10s.; on the Wandsworth "C" stock; £5 12s.; on the Wimbledon stock, £5 17s. 6d.; on the Epsom stock, £6 10s.; and on the new ordinary stock, £5 12s.

Re-Elections.

Proposed by the Chairman, and seconded by Sir Fortescue Flannery, the retiring Directors, Messrs. W. G. Langlands, H. S. Freeman, and R. M. Chart, were re-elected; and on the motion of Alderman Porter, seconded by Mr. F. Samson, the retiring Auditor (Mr. H. Willis Smith) was re-appointed.

Acknowledgments.

The Chairman asked the proprietors to reassert the kind things already said of their officers by passing them, their staffs, and the workmen and workwomen, a hearty vote of thanks. Mr. Braine had been with the Company a great many years; and his work was now being done under the greatest disadvantage, owing to the shortness of staff. There were now something like 117 women in the undertaking; and the way they were working here and everywhere was a splendid thing to see. Mr. Carr had faithful assistants and superintendents at the three works. It would be understood that on Mr. Carr and the engineering staff the question of coal transport had been one of the gravest anxiety. The men below were all doing their level-best—working short-handed, one man doing the work of one-and-a-half, and many of them were men above military age. The Company had furnished 514 men for the war; and he regretted that something like 3½ p.ct. would never come back. All honour to them.

Mr. A. W. Oke seconded the motion, which was heartily carried.

Mr. Braine, in acknowledging the vote on behalf of his staff and himself, observed that these were times that called for the utmost there was in all of us, and for that reason all were loyally striving to do their best, to the last ounce.

Mr. Carr, in reply, said that, from his staff and the workmen and workwomen, he obtained all the support he could hope for. In many instances, it was a case of sometimes working day and night, especially for some of the higher members of the staff. But they managed to get through the work, and that cheerfully. Something like 10 to 12 p.ct. of the employees were women; and they performed certain duties—from office work down to coal trimming. It would, he believed, be an interesting sight to some of the proprietors to see the women dressed in overalls doing practically men's work in coal trimming.

On the proposition of Alderman Porter, seconded by Mr. J. T. Maitland, a cordial vote of thanks was also passed to the Chairman and Directors.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

A High Make per Ton.

The Half-Yearly Ordinary General Meeting of this Company was held on Friday, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. Paddon, M.Inst.C.E., the Chairman, presiding.

The Secretary (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the report and statement of accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said the statement did not reflect in any great degree the very difficult times incidental to the period to which it related; and there was not a lot to which it was necessary for him to call attention. The summary of capital issued disclosed a figure which conveyed a considerable amount of re-assurance to those who were conversant with gas accounts generally, because it showed, as a deduction, that the amount of capital per million cubic feet sold stood at £473. This was not so low as with some companies; but having regard to what the figure had stood at not so very long ago, it was one upon which they might congratulate themselves. The very trifling amount shown as expended on capital account during the six months was nearly covered by the process of depreciation. Coming to the credit side of the revenue account, it would be seen that there had been a decrease of a little more than 8 million cubic feet in the quantity of gas sold, equivalent to just over 1 p.ct. on the total sale; but for public lighting there had been used less than a quarter-of-a-million feet, whereas the normal figure was about 20 millions. If, therefore, they had restored to them the output which had been arbitrarily removed by the restrictions upon lighting—restrictions very much more drastic in Brighton than they had ever been in the Metropolis—they would get back more than the trifling decrease now reported. The sale of gas per ton of coal carbonized during the period under review—and it had been very carefully arrived at—amounted to 13,362 c.ft. This was a large figure, even in these days of increased makes per ton. The unaccounted-for gas, and that used in the works and show-rooms, figured at 6·73 p.ct.; and having regard to the formation of the area of supply, he thought they would agree that this was not a bad figure. The total receipts from gas and stoves and fittings had increased by £7224; and they had lost on residuals, as compared with the corresponding period, £512, which followed as a matter of course from the slightly reduced business. The total increase on the credit side was £6655. On the debit, the chief item of increase was for coals, oil, and coke carbonized, which was higher by £12,504 compared with pre-war prices. The cost of coal, for the period to which these figures related, had increased by 50 p.ct., and of oil by 33 p.ct.; and these two figures dominated the accounts. In their dealing with the public, the Company had increased their charge by only 19 p.ct.; so that they had treated the consumers as

fairly and as generously as any purveyor of a public supply could do in the circumstances. Every other item in the accounts had gone up; and the only thing that had come to their assistance had been more rigid economy, wherever it had been possible to enforce it. Nothing had been neglected in the way of repairs and maintenance; and the aggregate of the figures under this head was still at a very handsome level, which would not, indeed, discredit a pre-war account. The total excess of expenditure as compared with a year ago was £12,681; and towards this, as he had already said, they had received £6655 more on the credit side; so that the profits had been decreased by £6026—that was, they were left with a profit of £24,877 to carry to the profit and loss account. Adding £73 for interest, gave a total of £24,951. For interest on debenture stock, temporary loans, and income-tax £5748 was required, and for the dividends £20,984. Thus they were short by £1781 of the amount needed, or very little more than ½d. per 1000 c.ft. The supply of raw materials was a source of great anxiety. As he had said, coal had risen 50 p.ct. in cost; and since the accounts were closed, it had gone up much more than this. It would, indeed, be nearer 100 p.ct., as compared with pre-war conditions. The Company had had the misfortune to lose one of the two steamers on which they relied for their supply of coal. The *John Miles* was destroyed by a mine; and, what was much sadder, was the loss of the brave lives that accompanied it. So far as they could ascertain, ten out of the fourteen men were dead. He paid a tribute to the hardihood and courage of these men, who persisted in fulfilling their duties for a remuneration that could not have been a great attraction to them, and which he paid them the supreme honour of believing they never really thought about. There was still one steamer running for them; but under existing restricted conditions, this was very inadequate. The Directors long ago realized that they must turn somewhere else for supplies; and the London, Brighton, and South Coast Railway Company had done all they could to help them to get coal in by rail. It was hoped to make good the lost ship in some way. With regard to oil, they contracted for a large quantity; but the contractors failed to deliver by some 4000 tons, in the period named, the amount bought. There was coal-gas plant enough to make all the gas; but they could not get the labour. Therefore they had to buy a small quantity of oil; but he did not think they would ever lean on the process again, as they had done in the past. It seemed to him the grossest inconsistency that, while the Government regulated and limited the great public utility services—such as railways and the supply of gas and water—the supply of coal should remain unrestricted and unrestrained, and the great industries to which he had referred could be paralyzed in a moment by the action of private owners of coal.

The Deputy-Chairman (Mr. G. W. Carey) seconded the resolution.

Mr. H. E. Jones said he was glad to see such a representative gathering present; for if ever there was a time when the directors of a public utility company—and especially a gas company—wanted the support and sympathy of the shareholders, it was now. Fresh burdens, heavier responsibilities, and greater anxieties faced them; and these would press with increasing force on the officers. Unless some almost superhuman effort was made, and some material alteration was accomplished, they would find themselves in a very serious and difficult position. They had no doubt noted what had happened under the recent stress of weather. The public had turned very largely to burning gas, rather than the coal or coke which they could not get. This was a very encouraging circumstance; and in the midst of all the darkness and gloom, perhaps the most substantial evidence had been afforded, by the experience of their own and other companies, that the great duty of fuel supply, of serving the domestic uses and mechanical arts with that which they needed, would fall more to the gas industry in the future, and redound remarkably to their success. This they looked forward to with great hopefulness. But meanwhile there was no doubt that there would be a time of extreme pressure and anxiety—not to say some danger, unless they could persuade the consumers as to the advisability of being "rationed," as on the Continent. Their Company would have been in greater difficulty to day, had it not been for their strong financial position.

The resolution was then carried unanimously.

On the proposition of the Chairman, seconded by Mr. A. F. Phillips, dividends were declared at the statutory rates per annum of 6 p.ct. on the "B" preference stock, 4 p.ct. on the "C" preference stock, 10 p.ct. on the original ordinary stock, and 7 p.ct. on the "A" ordinary stock.

Thereafter the retiring Directors (Mr. P. W. Colley and Mr. A. F. Phillips) were re-elected, on the motion of the Chairman, seconded by Mr. G. Crispe Whiteley; and the retiring Auditors (Mr. William Cash and Mr. Lewis Hardy) were also re-appointed.

Mr. H. E. Jones proposed a hearty vote of thanks to the Chairman, Directors, staff, and employees generally, speaking in terms of praise of the services rendered by one and all in the interests of the Company.

Mr. William Richards seconded this; and when it had been cordially passed, the Chairman acknowledged it.

A Fresh Record at Birmingham.—It is reported by the Birmingham Corporation Gas Committee that the output for the week ended Jan. 31 established a record in the history of the department, reaching 309,075,000 c.ft. The enormous demand was attributed to the severe weather then prevailing and the heavy requirements of factories.

Progress at Watford.—That the half-year's working had turned out surprisingly well was the gratifying intimation the Chairman of the Watford Gas Company was able to make to the shareholders at last week's meeting. Manufacturing charges, he said, were very much higher than in the previous year; an extra £2000 being absorbed by the increased cost of coal and oil. Pensions and war allowances, at £1010, were £250 up; but distribution charges were less. There had been a substantially increased sale of gas; but the receipts under this head were less, owing to a decrease of 2d. per 1000 c.ft. in the price. The profit and loss account showed an available balance of £8020; and the full statutory dividends were declared.

HORNSEY GAS COMPANY.

Low Capital and Good Working.

The Half-Yearly Ordinary General Meeting of the Company was held on Friday, at No. 5, Great Winchester Street, E.C.—Mr. A. M. Paddon, M.Inst.C.E. (the Chairman), presiding.

The Secretary (Mr. W. E. Roberts) read the notice convening the meeting; and the report and accounts were taken as read.

The Chairman remarked that, from whatever point of view the accounts now presented were looked at, they were eminently satisfactory in character. With considerable experience of such statements in the past, he personally did not detect any detail to which legitimate exception could be taken. In the first statement—capital stock—there was a change where a change was not often to be noticed. With the inclusion of the Act of 1916, "B" capital made its appearance as not bearing dividend, to the amount of £25,000. Now, this was purely a clerical entry, made necessary by the terms of the new Act. For very many years it had been their custom to show in each balance-sheet a large amount—anything from £36,000 to £43,000—by way of carry-forward of undivided profits. This really was absolutely against the practice enjoined by Parliament. For a very long time, Parliament had laid down the principle that the carry-forward of undivided profits should not exceed the amount required to pay one year's dividend. Of course, their own carry-forward was out of all relation to this. When, therefore, they went to Parliament to divest themselves of certain very important disabilities, and to acquire powers absolutely necessary to carry on their undertaking in the teeth of the difficulties with which they were confronted, Parliament made them adopt a whole series of changes in their statutory powers—bringing them into line with practice at the date at which their application was made. And this was one of the changes. Of course, the huge carry-forward of the past to which he had referred very much misrepresented the true character of the entry. It had long ceased to be divisible profit. Much had been used for capital purposes in certain ways—or, at all events, for working capital. Therefore they adopted a precedent which had been established in the case of another company, and had nominally capitalized the amount. But it differed from the other capital in that it made no demand upon the earning power of the Company. They were still left with a very much larger margin of carry-forward than that he had mentioned as the practice of Parliament, and which might have been imposed upon them as a limitation. In the accounts before them, the carry-forward was £11,799, after deducting the dividend. It was shown that the total capital expended was £255,182, which was at the rate of £472 per million cubic feet of gas sold per annum. This was a figure that would be creditable to a very much larger company than theirs, and it was peculiarly so to an undertaking selling between 500 and 600 million cubic feet of gas per annum. The capital expenditure in the half year amounted to only £387; and as they had written off depreciation to the extent of £846, the position was slightly improved. Coming to the revenue account, there had been a decrease in the gas sales, as compared with the corresponding period of 1915, of a little over 1 p.ct. This was to be expected in the circumstances, if only by reason of the operation of the Summer Time Act and the extinction of public lighting. In so far as it represented any loss to the Company, this would be re-established in the ordinary course of things in the future. They had sold 12,790 c.ft. of gas per ton of coal carbonized; and the quantity unaccounted-for was 5·6 p.ct. These were both, he was sure they would all of them agree, satisfactory figures. There had been some rather startling changes in the case of residual products. Coke had brought in £8766 more, and ammoniacal liquor £612 more; and when they brought into operation the new process which they were empowered to use by their 1916 Act, a considerable increase in the latter item of profit might be looked for. The total increase in the receipts was £7652. Looking at the other side of the account, coal and oil cost £6128 more; and after making all proper provision for repair and maintenance of works and plant, putting £500 more aside by way of allowances to dependants, and appropriating £550 to the benefit fund, which was not done a year ago, the total expenditure exceeded that of the corresponding period by £5138. The profit was £2514 more, and these two items accounted for the excess of receipts to which he had referred. They carried forward to the profit and loss account £8913, and there was a small matter of interest to add. When these credits were set against the demands for income-tax, interest, and the other charges and dividend, the net result was a deficit on the half year of £6—in other words, they required £9121, and had brought to book £9115. Having regard to the qualifications he had mentioned, and to the fact that there had been completely wiped off the parliamentary expenses (£555) attached to the new Act, they would agree that this was an extremely satisfactory result. During the period under review the Company had been subjected to the ordinary disturbing influences in connection with labour. Of their employees, 103 had joined the Colours; and they were now utilizing the services of something like 40 women to supplement the depleted labour forces. Since these accounts were closed, a very great deal had happened, but not anything which he could say had materially qualified their position as a trading concern. The Directors had taken up £6000 (new money) in the War Loan. As to the future, he must say that, as compared with other gas companies, their own position was a comfortable one. The supply of coal in the northern districts of London for the purposes of gas making had been well maintained all through the winter; and now the most difficult time was behind them. They had a good stock of coal, and had been able to renew their contracts at very much the same prices as twelve months ago. Since the turn of the year, the increase in the Company's business, in common with that of all other gas undertakings, had been very large. Of course, their own interests were identified with the national interests; but he did not know of any gas undertaking which could contemplate the future with less apprehension than could the Hornsey Gas Company. He concluded by moving the adoption of the report and accounts.

Mr. A. F. Phillips seconded the motion; and it was carried unanimously.

On the proposition of the Chairman, seconded by Mr. J. M. Miles, dividends were declared for the half year at the rates of 5 p.ct. per

annum on the preference stock, 12 p.ct. per annum on the "A" stock, and 9 p.ct. per annum on the consolidated stock—less income-tax.

The retiring Directors (Mr. G. W. Carey and Mr. F. H. Jones) were re-elected, on the motion of the CHAIRMAN, seconded by Mr. PHILLIPS; and the retiring Auditor (Mr. E. L. Burton) was re-appointed on the proposition of Mr. H. MITCHELL, seconded by Mr. F. G. PILLEY.

Mr. PHILLIPS proposed a vote of thanks to the Engineer and General Manager (Mr. J. W. Buckley), the Secretary, and staff for their services. He remarked that the staff had overcome in a most surprising manner the many difficulties with which they had been confronted, and the results obtained were eminently satisfactory. In the works Mr. Buckley had been highly successful, as regarded the make of gas from the coal, the production per retort, and the economical use of fuel; and they all knew that Mr. Roberts efficiently looked after the secretarial work.

Mr. JOSEPH CASH seconded, and expressed keen sympathy with Mr. Buckley. He remarked that the war had altered everything, and had added tenfold to the troubles and anxieties that the manager of a gas-works had to contend with. The accounts were very satisfactory, and their hearty thanks were due to the staff for what they had done.

Mr. BUCKLEY, responding to the vote, which was cordially passed, said that nothing could be more encouraging to the officials than the remarks that had fallen from the lips of two such eminent gas engineers as Mr. Phillips and Mr. Cash.

The Chairman and Directors were also thanked for their services, on the motion of Mr. H. P. BODKIN, seconded by Mr. MITCHELL.

SOUTH SHIELDS GAS COMPANY.

Mr. Penney's Retirement.

The Annual Meeting of the Company was held last Tuesday, at the Offices, in Chapter Row—Mr. T. W. WALLIS presiding, in the absence through indisposition of Mr. James Readhead.

The CHAIRMAN, in moving the adoption of the report and accounts, said he would content himself with reading the speech which Mr. Readhead would have delivered had he been present. The accounts showed that the income was £105,388, and the expenditure £92,221, leaving a profit of £13,166. As extraordinary charges had fallen upon the Company during the year, entirely due to the war, a sum of £5000 was being transferred from the insurance fund; and after paying the full statutory dividends, there was a balance to carry forward to next year of £20,095, against £20,868 brought from the previous year. The statutory dividends payable for the whole year were less than the previous year by reason of the operation of the sliding-scale—namely, 8 and 5¼ p.ct. respectively on the two classes of stock for 1916, against 8¼ and 5⅝ p.ct. for 1915. The sliding-scale was never intended to cope with such abnormal conditions as now existed by reason of the war. It was devised for ordinary fluctuations of trade and management; and it was to be hoped that relief would be granted to sliding-scale gas companies in respect of its operation. Coal and oil had cost £5694 more, and wages (including war bonuses) £2119 more; and the cost of all materials had been further increased. There was a decrease in the quantity of gas sold of 6·22 p.ct., and, notwithstanding that the price of gas for the first half of 1916 was 2d. more than the first half of 1915, the receipts for gas showed a decrease of £2091. Public lighting continued for one-third of the year 1915, but was totally abolished throughout 1916; and while more gas had been used for industrial and heating purposes—in the latter case by a considerable increase in the use of gas-fires—the stringent lighting restrictions, &c., accounted for the net decrease. The Company paid during the year £2609 as war bonus to employees and £837 to representatives of employees who have joined the forces. Female labour had been introduced to the utmost extent to liberate men and youths wherever possible; and at the present time 30 p.ct. of the employees of the Company were females. But, unfortunately, efficiency suffered thereby. The nature of employment in a gas-works did not favourably lend itself to female labour, excepting to a very small extent. The Ministry of Munitions early last year made the Company a certified establishment, by reason of the work of national importance being done. The greatest difficulty was being experienced by the Company in carrying on essential work with the class and limitation of labour available. The price of gas had been increased from the beginning of this year by 2d. per 1000 c.ft.; and had it not been for the Company's reserve fund (which now stood at £25,703), the price would have been further raised. He moved the adoption of the report.

Colonel DAWSON seconded, and echoed the hope that they would ultimately see the end of the sliding-scale. He was glad other companies were moving in the matter, and trusted they would do all they could to bring the subject under the notice of the Government.

The motion was agreed to, as also was that as to the dividend.

The CHAIRMAN, referring to the retirement of Mr. J. H. Penney from the secretaryship, said Mr. Penney had been in the service of the Company for 51 years, and for 40 years of this time had been their Secretary. He did not think it was possible to have had a better man in the position. He had the Company's welfare at heart, and was always willing to assist the Board in every way; while his courteous manner endeared him to all, including the consumers, and the various staffs. These facts had been discussed by the Directors; and at their request he now moved that Mr. Penney be awarded a pension of £300 per annum as from Jan. 1, 1917, on his retirement from the secretaryship owing to ill-health.

This was seconded by Mr. J. H. READHEAD, and was unanimously agreed to.

The CHAIRMAN then moved the appointment of Mr. A. Pickering as Secretary, in succession of Mr. Penney. He said Mr. Pickering had been ten years with the Company, and all this time under the direction of Mr. Penney, who recommended him as a very capable, experienced, and valuable servant. The Directors had the highest opinion of him; for he had always given satisfaction to them. He moved his appointment at a salary of £450 a year.

Colonel DAWSON seconded; and the resolution was carried.

BARNET DISTRICT GAS AND WATER COMPANY.

Confidence in the Future of the Undertaking.

The Half-Yearly Meeting of the Company was held on Monday of last week, at the Offices, No. 139, Cannon Street, E.C.—Mr. A. F. PHILLIPS, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. Ernest W. Drew, F.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said they were meeting that day for the sixth time since the disastrous war began. The uncertainties of the future were still before them; but the proprietors might congratulate themselves upon the results of the past half year. It had been a time of anxiety. There had been difficulty in obtaining coal and all other material required for carrying on the business, and inconvenience by the continual depletion of the Company's employees for military service. The statement of accounts was evidence that all these difficulties had been met, and the position of the Company satisfactorily maintained. At the commencement of the war the Company's employees numbered 160. Of these, 90 had since joined for military service; and those remaining were men who had been for years in the Company's employment, and were long past military age. The places of many had been filled by women, who continued to render excellent service. Allowances were being made to the dependants of those on active service. It would be seen from the revenue that this item, with the war bonus, had increased on the gas and water from £449 in the corresponding half of last year, to £1045 for the past six months. There had not in the period under review been any addition to the capital expenditure in either the gas or water works. The sale of gas showed a falling off of 3 p.ct., as compared with the previous corresponding half year. This might be considered satisfactory, with the economy in lighting which resulted from the Summer Time Act. The Company's gas district did not develop rapidly. The working results were good—12,874 c ft. of gas and slightly over 10 cwt. of coke having been sold for each ton of coal carbonized. The receipts for gas were £544 less, and for products £229 more. Coal cost £8571, against £7495, though the quantity carbonized was 114 tons less. Oil and coke for carburetted water gas cost £178 more. Carbonizing wages were £85 less; and there was a saving of £814 in repairs of works, and £191 in repairs of stoves and fittings. The other expenses remained much the same; the resulting profit for the half year being £4010, against £4593 for the corresponding half of 1915. In the water undertaking, the net receipts for water were practically the same (£24,468, with an increase of only £69). There were no new buildings being erected in the district, and only a few additional customers had been obtained. The profit was £14,326, against £14,636 in the corresponding period. The water supplied was 416 million gallons, or an increase of 16 million gallons. Adding the £18,619 profit from the gas and water to the £24,026 brought in from the last account, after providing for income-tax and interest on debentures, and adding £1000 to the contingency fund, there remained £34,328, of which the dividends recommended would absorb £11,125—leaving £23,203 to be carried forward. Since the last meeting they had lost a member of the Board—Mr. James L. Chapman—who had rendered the Company good service for eleven years. To fill the vacancy the Board appointed Mr. Colin Docwra, a gentleman whose experience would be of great value, and who was also a considerable stockholder. The works and plant had been maintained in a thoroughly satisfactory condition. It was difficult to forecast what might happen in the anxious times now being passed through; but there was reason to hope that the present condition of the Company would be maintained, though at present the business showed no increase. It should be remembered that the price of gas was only increased 2d. per 1000 c.ft. The development of the gas business undoubtedly suffered from the depletion of the outdoor staff. The Directors had subscribed for £10,000 of the War Loan. They felt it was incumbent on the Company to do so, from patriotic motives; and they had to consider the value of the Company's property. Unless all people, either with their lives or their money, did all in their power to bring the war to a satisfactory termination, the result would be too disastrous to contemplate.

The DEPUTY-CHAIRMAN (Dr. J. W. L. Glaisher, F.R.S.) seconded the motion; and it was at once agreed to.

Proposed by the CHAIRMAN, and seconded by Mr. ALFRED LASS, F.C.A., dividends were declared, less income-tax, for the half year, at the rates per annum of 9 p.ct. on the "A" and "C" stocks, 8 p.ct. on the "B" stock, and £6 6s. p.ct. on the "D" gas and water stocks.

The retiring Directors were Mr. Samuel Cutler and Mr. Colin Docwra; and the CHAIRMAN proposed their re-election, which was seconded by Mr. J. E. PLUMMER, and agreed to; as was also the re-appointment as one of the Auditors of Mr. C. P. Crookenden, F.C.A.—moved by Mr. HAROLD FOSTER, seconded by Mr. WILLIAM RICHARDS.

The CHAIRMAN then proposed a hearty vote of thanks to the staff and all the employees. He assured the proprietors that all had worked most loyally for the Company, and added that during the past six months the staff had had a very trying time. The best men were being taken for military service; and it was exceedingly difficult to replace them. When, too, substitutes were found, it required much instruction to get them into the work. In this, their Engineer and Manager, Mr. F. J. Bancroft, had been most successful; and he (the Chairman) cordially congratuluted him on the success which had attended his administration. As to Mr. Drew, they all knew what a first-rate Secretary he was.

Mr. PLUMMER, in seconding the vote (which was unanimously passed), said they were certainly much indebted to the staff, who had been passing through a strenuous time.

Mr. DREW having briefly acknowledged the compliment on behalf of himself and the office staff,

Mr. BANCROFT expressed the thanks of those at the works, who, he declared, well deserved the kind things the Chairman had said of them. They loyally guarded the interests of the Company and the public.

The Chairman and Directors were also thanked, on the motion of Mr. FOSTER, seconded by Mr. CROOKENDEN.

CONSOLIDATED GAS COMPANY OF NEW YORK.

Report for the Year 1916.

The report which was submitted at last month's annual meeting of the Consolidated Gas Company of New York stated that the gas sales increased during 1916 615,301,300 c.ft., or 3·92 p.ct., as compared with the previous year. In 1915, there had been a decrease in gas sales of 5·02 p.ct., as compared with the previous year. The gas sales, and those of the affiliated Gas Companies in the Borough of Manhattan, increased during the year 829,207,600 c.ft., or 3·83 p.ct., as compared with a decrease of 5·38 p.ct. in 1915. In the Borough of the Bronx, a decrease in the consumption of gas per consumer was offset by an increase in gas sales, resulting from the development of building operations; so that the gain therein during the year in the volume of sales amounted to 98,525,194 c.ft., or 2·34 p.ct., as compared with a loss of 0·7 p.ct. in 1915. In Westchester County and in the Borough of Queens, both of which are growing territories, the sales of gas increased during the year 203,447,469 c.ft., or 8·52 p.ct., as compared with a gain of 1·98 p.ct. in 1915. The combined gas sales of the Consolidated Company and the affiliated Companies in the Boroughs of Manhattan, the Bronx, and Queens, and Westchester County amounted to 1,131,180,263 c.ft. more than in 1915—a gain of 4·01 p.ct., as compared with a loss of 4·12 p.ct. in 1915.

The combined station output of the Company and affiliated Companies in 1916 showed an increase over the output for the preceding year of 4·85 p.ct. The increase in the day output was 8·18 p.ct., and in the night output 1·52 p.ct. From these figures, it is apparent that the increase was largely due to an increase in the use of gas for industrial, commercial, and domestic purposes, rather than for illumination. An indication of the increase in the use of gas for domestic purposes other than illumination is found in the fact that during the past year the net increase in the number of appliances in use designed for cooking, heating, and other domestic uses, installed by the Company and affiliated Companies, exclusive of appliances installed directly by manufacturers or their agents, amounted to more than 100,000.

The use of gas for industrial purposes is assuming even greater proportions. During the year, 3929 industrial appliances were installed, having an estimated annual consumption of 165,670,000 c.ft. The installation of many of these appliances represented the utilization of gas for new industrial purposes, developed during the year. The improvement of this market for their output has engaged the Company's closest attention; and every effort has been, and is being, made to stimulate the growth of this branch of business. In the accomplishment of this result, reliance is placed upon the activities of a well-organized Utilization Department, highly-trained corps of salesmen, demonstrators and inspectors, specialized advertising and circularizing, and active co-operation with the Industrial Fuel Appliance Committees of the National Gas Association, and representatives of the industrial fuel appliance manufacturers, with a view to the discovery and exploitation of new fields of utilization.

More than 3000 hotel and restaurant appliances were installed during the past year, including, approximately, a mile of hotel ranges. On Dec. 31, 1916, the Company and affiliated Companies had on rental to consumers 448,813 cooking appliances of various types—an increase of 19,830 over the number installed at the end of 1915. The rated horse power of the gas-fired steam-boilers installed on the district on Dec. 31, 1916, exceeded the horse power a year earlier by some 72 p.ct. During the year the Company and affiliated Gas Companies installed 193,430 appliances, and there were surrendered to the Companies 84,578—a net increase of 108,852 in the number of appliances in use, which had been installed by the Companies, as against the net increase in the previous year of 90,396, and in 1914 of 61,570 appliances.

The increase in the cost of labour, anthracite and bituminous coal, and gas oil, as well as other materials and supplies, will increase the cost of manufacturing and distributing gas during the present year. It is estimated that the increase in the cost of gas oil alone (approximately 2 c. a gallon) will add $2,400,000 to the gas-manufacturing cost of the Company and affiliated Companies. It has been very difficult during the year to secure a regular or necessary supply of anthracite or bituminous coal.

The construction of the rapid-transit subways has greatly interfered with the distributing system, and rendered it extremely difficult to comply with the pressure regulations prescribed by the Public Service Commission. Many miles of the gas-mains, temporarily placed above ground, are exposed to sudden and extreme variations in temperature; making it at times impossible to retain the normal proportion of illuminating constituents in the gas passing through them, and rendering it very difficult to maintain the candle power required. The loss in calorific value of gas, as compared with the loss in candle power, is inconsiderable; and, as a very large percentage of it is used for industrial, commercial, or domestic purposes, or for illumination with incandescent mantles, the effect of a diminution in candle power, so far as a large majority of consumers are concerned, is negligible. No change has been made by the Public Service Commission for the First District in the standards of quality of gas prescribed by the Legislature. In England, laws have recently been enacted, making it optional with the companies to elect whether they will work under the candle power standard or the calorific standard. In this country, many States are now working under the calorific standard, and others are moving in the same direction. In the State of New York, the Public Service Commission for the Second District, which includes the entire State with the exception of New York City, have adopted the calorific standard for gas companies within their jurisdiction.

In November, 1916, the Board of Trustees of the Consolidated Gas Company and the Boards of Directors of the affiliated Gas and Electric Companies, in recognition of the faithful and efficient discharge of their duties by the employees of the various Companies, adopted resolutions providing for the payment quarterly to employees who have been in the service of the Companies for not less than six months, and who receive a rate of pay not exceeding $3000 per annum, of a share in the profits based on the annual dividend rate on the capital stock of the Consolidated Gas Company (as indicated by the quarterly dividends), and calculated upon the regular salaries or wages actually paid to the employees. The first payment was at the rate of 7 p.ct., and was calculated upon the salaries or wages paid to the employees during the three months ended Nov. 30.

The municipal street-lamps on the lines of the Consolidated Company and affiliated Gas and Electric Companies on Dec. 31, 1916, consisted of 7052 incandescent gas-lamps, 397 open-flame gas-lamps, 444 electric arc lamps, and 62,110 electric incandescent lamps—a total of 70,003. The number of gas-meters in use at the end of 1916 was 951,808. The combined sales of gas of the various Companies during the year were 29,371,468,652 c.ft., an increase over the previous year of 4·01 p.ct.

Included in the report was the following condensed statement of the assets and liabilities of the Company:

ASSETS.

Fixed assets, including land, plant, and equipment	$54,060,833·20
Bonds and stocks of, and advances to, affiliated Companies, and other investments	111,109,846·33
Bonds and mortgages	600,000·00
Cash	2,511,699·96
Accounts receivable	5,278,599·57
Material and supplies	985,085·75
	$174,546,064·81

LIABILITIES.

Capital stock	$99,816,500·00
Convertible debentures	24,846,772·50
Accounts payable and accrued charges	4,116,957·11
Stock premiums	13,918,878·23
Renewal and reserve funds	12,736,260·33
Profit and loss	19,110,696·64
	$174,546,064·81

THE HALIFAX NEW BASIS OF CHARGE

For Heating and Cooking.

Referring to the new basis of charge for gas for non-lighting purposes (as an alternative to fixing separate meters) which the Halifax Corporation are adopting, the "Halifax Courier" makes the following remarks. The scheme, it will be recalled, was outlined in the "JOURNAL" for the 6th ult. [p. 261].

The Gas Committee are introducing a scheme whereby to encourage consumers in the greater use of gas for heating and cooking purposes, by supplying this at a cheaper rate than that for lighting. It is an entirely new scheme, and is therefore of an experimental character. It has not been tried elsewhere; and should it prove the success anticipated, it will be known as the "Halifax scheme." The initiation of a scheme generally takes about twelve months; and by proceeding in a cautious way, it is hoped to develop the one in question on sound lines. The desire is to bring the advantages of gas for the warming of rooms and cooking of food within the reach of every householder in the borough, and to do so without the cumbersome system of having separate meters for the non-lighting consumption, though persons who prefer a separate meter can have one at their own expense.

There are various means of arriving at the amount of gas required for the lighting of a house, without fixing another meter. One method would be to take the average amount of gas consumed in the same house over a period of years. This would be a fair basis, so long as the house was occupied by the same person; but a change of tenancy would create another standard, and lead to confusion. To avoid this difficulty, the Committee decided to fix a standard by some other means. They therefore fell back upon the elementary principle of basing the standard upon the amount of area to be lighted. For example: A room measuring 10 ft. × 10 ft. would require 5000 c.ft. of gas to light it for an average lighting year of 1600 hours. This standard has been arrived at as a result of measuring-up and reckoning-out the floor areas of 120 houses in Halifax, and comparing these areas with the actual amount of gas used for lighting for some years back. By this process, a factor of 50 has been fixed upon. In order to apply the principle to any house, all that is necessary is to multiply the floor area of living and sitting-rooms, in superficial feet, by 50.

The following will serve as a typical example: A living room which measured 10 ft. × 10 ft., has an area of 100 superficial feet. Multiplied by 50, this represents 5000 c.ft. per annum. The area of the sitting room is (say) 12 ft. by 10 ft., or 120 superficial feet. Multiplied by 50, this equals 6000 c.ft of gas per annum, making a total for the two rooms of 11,000 c.ft. required for lighting purposes. All the other rooms and places in the house—bedrooms, scullery, cellar, passages, bath-room, &c.—are combined for the purposes of calculation, and are reckoned at half the requirement for the two main rooms; the amount thus being 5500, and making a total for the whole house of 16,500 c.ft. per year for lighting. The present price is 2s. 7d. per 1000 c.ft.; but under the new scheme any gas consumed over the standard fixed for the house will be regarded as used for cooking or heating purposes, and will be charged at 2s. per 1000 c.ft. Thus, a man living in a house of the kind illustrated would, on a consumption of 26,500 c.ft. of gas, save 5s. 10d. on the present charges.

Several applications have been received for "measuring-up." There is no compulsion about the scheme; and, where there would be no advantage, consumers need not adopt it. But in many cases there would be a decided gain. After the war, it is hoped it will be possible to reduce the factor, in which case the advantage would be greater. The scheme, it should be clearly pointed out, does not increase the responsibility of the consumers. They only pay for what they burn, whether it be below or above the standard. It is not proposed to increase the expenditure per inhabitant. It is only proposed to try and create a transference whereby the consumer can transfer part of his expenditure on coal to gas. The idea is to look ahead. If in the next ten years the output of gas could be increased by 64 p.ct., it would represent an increased revenue of £50,000 per year, based on the pre-war charge of 2s. per 1000 c.ft. net. This increased revenue could be obtained without raising the capital account, as the mains, service-pipes, and meters would be the same.

Price of Gas at Lancaster.—At the meeting of the Lancaster Town Council last Wednesday, a proposal of the Gas Committee to decrease the price of gas 3d. per 1000 c.ft., to 2s. 7d., was withdrawn, owing to an objection from the Finance Committee. The profit on the year was £8000; but £7000 will be placed to reserve.

SOUTH SUBURBAN GAS COMPANY'S STAFF.

Military Representative's Appeals.

The Metropolitan Asylums Board Committee of the Appeal Tribunal last Thursday heard the appeal of the Military Representative for Lewisham [see *ante*, p. 369] against exemptions of three months from Feb. 12 granted by the Lewisham Local Tribunal to 57 employees of the South Suburban Gas Company. Of those appealed for, 13 were members of the clerical staff, 6 were slot-meter collectors, and 38 gas-fitters. There were 31 men classed A, and 26 B1; 16 were 31 years of age and under.

The CHAIRMAN (Mr. E. Forbes Lankester, K.C.), in giving the decision of the tribunal, said the appeal for five show-room clerks would be allowed. The tribunal thought they could be replaced. The two men who were passed Class A would not be called up for fourteen days; they felt it was most important that men of this class should begin their training at once. The three B1 men would not be called up for six weeks, in which time women, or some other men, might be taught the work. Coming to the men employed at the head office, the appeal for the Company's special fittings and contracts clerk would be allowed—not to be called up for one month. The clerk in the residuals office was, he considered, engaged on work which might be learned without very much difficulty. The appeal would be allowed—not to be called up for fourteen days. The appeal for the assistant to the Distribution Superintendent would be allowed—not to be called up for one month. Mr. Chandler, the chief of the Sales Department, occupied an important position, and he would be allowed two months, with leave to renew. The appeal for the wages clerk would be allowed—not to be called up for two months. The case of the National Health Insurance clerk would be adjourned for one month, and referred to the National Health Insurance Commission. The appeal for a ledger clerk was allowed—not to be called for one month. The exchange and accounts clerk was a man who might be useful in a case of emergency. He would be exempted for two months, with leave to renew. The district foreman was also a man of considerable importance—one whom the Company could not replace; and he would be granted two months. As to the slot-meter collectors, the members of the tribunal were all quite clear that male slot-meter collectors must go out of fashion, and the work be done by women. The Military Representative's appeal would be allowed; but the men would not be called up for one month, in which time substitutes in the shape of women could be found to do their work. As regards the gas-fitters, their case was, of course, more difficult. There were eight men engaged on the same sort of work as women—mantle cleaning and so on. The appeal for the four Class A men would be allowed; and they must go at once. The four B 1 men would have one month. Of the remainder of the gas-fitters, the appeal would be allowed for the twelve men of 31 and under. But they would not be called up for fourteen days, which would give the Company time to distribute their staff. The men over 31 would be exempted for two months—their work being of considerable importance. When they came again, the tribunal would be anxious to know how far they were really still necessary; and they would then hear the cases in view of the conditions which might exist from the Military Representative's point of view. As to the men's domestic claims, the Company had behaved in a very proper way to their employees, and had removed any difficulty there might have been on this ground.

EDINBURGH GAS-WORKS EMPLOYEES' WAR-SAVINGS ASSOCIATIONS.

Edinburgh, under the lead of its new Lord Provost (the Rt. Hon. J. Lorne MacLeod), manifested much enthusiasm over the recent War Loan. It was on the suggestion of the Lord Provost that a War Loan Bureau was opened in Princes Street, where hundreds of people sought and obtained information regarding the different forms of investments, methods of conversion, &c.

The formation of War Savings Associations has been taken up with avidity by the citizens. As was briefly announced last week, the men at the Granton Gas-Works held a meeting on the 21st ult., which was addressed by Admiral Sir Arthur Farquhar, the Convener of the Works Committee (Judge Lindsay), and the Hon. Secretary of the Edinburgh Central War Savings Committee (Mr. Archibald Campbell, S.C.C.). The men immediately decided to form the Granton Gas-Works War Savings Association, and at once elected the office-bearers. Similar Associations have been formed in connection with the Distribution Department, and the Leith Depôt; the initial membership being 110, 46, and 12 respectively. On Wednesday last a meeting of the Treasurer's staff was held, and a fourth Association created. It was stated then that some of the Treasurer's officials preferred to join the Edinburgh War Loan Society. This Sociey—the only one of the kind in the country—has met with the approval of the Treasury, and is to be registered under the Friendly Societies' Acts. It made application, through an Edinburgh Bank, for £100,000 of 5 p.ct. War Stock, which the members will acquire on a system of instalments. By paying 1s. per fortnight, the subscriber, at the end of about 13 years, will become the owner of £25 of stock; 2s. per fortnight will bring him £50; and so on. The advantage of joining this Society is that the members will have a long-time investment; whereas those who buy certificates will have to find a fresh investment for their money when it is repaid at the end of five years. It is understood that the whole of the £100,000 has been applied for.

Mr. J. B. Bolton, an Edinburgh chartered accountant, has been he leading spirit in this movement; and he is deserving of great credit or the time and thought he has devoted to it.

CHELMSFORD GAS UNDERTAKING TRANSFER.

Recommendations as to Officials.

The Chelmsford Town Council have decided to apply to the Treasury for sanction to the borrowing by the Corporation of the sum of £86,056, the amount of the purchase money agreed to be paid to the Gas Company for the purchase of their undertaking.

In this connection, Mr. E. W. Smith, the Engineer and Manager of the works, has applied to the Council for appointment under the Municipality; and the Parliamentary Committee say: Mr. Smith is at the present time in receipt of a salary of £500 per annum from the Company, together with free gas; and he is also allowed to act as Consulting Engineer to the Ingatestone and Witham Gas Companies, which appointments in the ordinary course necessitate his attendance at Ingatestone and Witham a few times a year. The Committee are unanimously of opinion that it would be in the best interests of the Corporation that Mr. Smith should be appointed Engineer and Manager of the undertaking as from March 31, and therefore recommend that he be so appointed, with a salary at the rate of £500 per annum, inclusive of all services to be rendered by him.

The Committee also recommend that the Secretary (Mr. R. E. Wackrill) be appointed as temporary Secretary of the undertaking for one year from March 31, with a salary at the rate of £300 per annum, inclusive of all services to be rendered by him. He is to devote his whole time to the duties of the office.

At the annual meeting of the Gas Company, Mr. A. S. Duffield, who presided, said the accounts for the past year did not really affect them as a Company; but they had to keep them for the Corporation, and stockholders could have a copy on applying for them. They had already had their 5¼ p.ct. dividend, as before. The Corporation would take over the concern on March 31; and as a Company they would after that have nothing more to do with the making and distribution of gas. All they would have to do would be to receive the interest from the Corporation, pay the interest on debentures, and then distribute the rest among the shareholders. It was confidently believed that they would be able to pay dividends at the same rate as in the past until the Corporation were allowed to borrow the purchase-money, which might be a year after the war. When the money came in, the debenture-holders would be paid off, the stockholders would receive their money in due course, and the Directors would wind-up the concern. It was fairly certain the stockholders would not be asked to pay the Directors any fees or expenses, which would be met by the Corporation.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 5.

Tar products remain generally in about the same position as recently. The shortage of tonnage, besides the heavy freights suggested, combine to practically, though not entirely, stop shipments of pitch. Ordinary London creosote finds a ready market at about 4½d. net per gallon in bulk at makers' works, for fuel purposes; but, of course, large quantities are being taken under the Government purchase at 67s. 6d. net per ton *ex* makers' works on the Thames.

Sulphate of ammonia is in great demand for home agriculture at the price lately fixed by the Government—viz., £16 net per ton for 24½ p.ct., carriage paid and bags free. No sulphate is being exported.

Tar Products in the Provinces.

March 5.

There is nothing fresh to report, and prices remain unaltered. Nothing of importance is reported in pitch. Solvent and heavy naphthas are steady.

The average values of gas-works products during the week were: Gas-works coal tar, 20s. 6d. to 24s. 6d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s., Liverpool 16s. 6d. to 17s., Clyde 17s. to 18s. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3½d. to 3⅝d. Heavy oils, in bulk, North, 3⅝d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *March* 3.

The export market for this material continues to be to all intents and purposes non-existent. The prices fixed for home agriculture are unchanged, at £15 10s. to mixers and distributors, and £16 per ton direct to farmers, net cash, in makers' bags, carriage paid to consumers' station.

Nitrate of Soda.

This market has advanced further, and spot quotations are now 23s. 9d. per cwt. for ordinary and 24s. for refined quality.

Manchester District Tar Prices.

The average price realized for tar, based on the value of the products for January deliveries in the Manchester district, was 27s. per ton.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is irregular; there being the lack of tonnage and the high freights to contend with. There is also the uncertainty as to the methods of control the Government may stipulate for at the collieries, which are now nominally all controlled by them. Prices, however, do not as yet show any great alteration. In the steam coal trade, best Northumbrians are about 30s. per ton f.o.b.; second-class steams are near 20s. to 24s., with a moderate inquiry; and for steam smalls the price varies, according to the class, from 17s. to 19s. 6d. per ton. Tenders for the Norwegian State Railways have been sent in; and it is believed that the price will be near the general market quotations just given. In the gas coal trade, shipments are fair in the circumstances; but the supply seems now more ample. Best Durham gas coals are quoted from 25s. to 26s. per ton f.o.b.; for second-class gas coals, the general price is now 18s. to 20s.; and "Wear Specials" are from 28s. to 30s., with a fair demand. Rates of freight are very high—one of the latest fixed being for gas coal from the Tyne to London, 18s. 6d. per ton; while for coke 45s. is the ruling freight from the Tyne to the ports of northern France. The home trade is steady for gas coal; and in some of the local towns the consumption of gas in recent weeks has been at a record height; so that on the one hand the coal consumption has been heavy, and so has been the output of coke. As to the latter, the price quoted is still from 32s. to 33s. per ton for good quality f.o.b. in the River Tyne.

Variation in Tar Prices.

A report of the Chelmsford Town Council quotes the following tenders for the supply of tar during the next twelve months:

	Price per Gallon.
Bristowe & Co., Ltd., Westminster	5¾d.
W. & C. French, Ltd., Buckhurst Hill [Tarvia]	5¾d.
Grindley & Co., Ltd., Poplar	5d.
Catchpole and Sons, Rotherhithe	4d.
W. & C. French, Ltd., Buckhurst Hill	4d.
Gas Light and Coke Company	3·67d.
Forbes, Abbott, and Lennard, Ltd.	3¾d.
W. B. King and Co., Ipswich	3½d.
Thomas Crow and Sons, West Ham	3¼d.

Increased Yield of Gas per Ton at Exeter.

The annual meeting of the Exeter Gas Company was presided over by Mr. G. H. Harris, who, in moving the adoption of the report [*ante*, p. 359], said that, considering the circumstances under which all such undertakings were carried on, it might be considered satisfactory. The quantity of gas extracted per ton of coal increased 335 c.ft. last year, though the coal was of inferior quality, and they had lost a great number of their skilled stokers. They had had more demand for the installation of stoves for cooking and heating than they could attend to, owing to the shortage of labour. As to residuals, they had come to an arrangement with the Plymouth Gas Company, and practically all the companies in Devon and many in Cornwall, which would enable them to secure a more steady and reasonable price for tar in the future. They had been producing benzol for the Government; but what the pecuniary effect of their installation of apparatus would be, he did not know. It did not really matter, because they were doing it for the benefit of the country. No less than 55 p.ct. of the staff had joined the Colours; and those who remained deserved thanks for the way in which they had maintained the efficient working of the Company. The report was adopted.

Meeting War Conditions at Winchester.

When submitting the report and accounts for the half year ended Dec. 31 to the shareholders in the Winchester Water and Gas Company, the Chairman (Mr. J. C. Warner) said the broad result was that they had standing to the credit of the profit and loss account at the present time £8420 which would enable them to pay a dividend of 4 p.ct. on the preference stock and 4¼ p.ct. on the ordinary stock—less income-tax. There had been a falling-off in the revenue from gas to a very appreciable amount; but the reasons for this must be obvious to all. On the expenditure side, there were two items which stood out prominently. The first was the heavy increase in the cost of coal. The Engineer (Mr. H. C. Head) informed him that twelve years ago their coal cost them about 14s. per ton, whereas it was now more like 29s. per ton. The second important item was the cost of labour. Since the war began, however, they had only increased the price of gas 2d. per 1000 c.ft., or 5 p.ct., while the Corporation electricity undertaking had raised their charges 25 p.ct. The recovery plant installed at the instance of the Minister of Munitions was in good working trim; and application had been made to the Board of Trade for an Order substituting a calorific standard for the illuminating power standard. He wished to express the thanks of them all to Mr. Head, who, more than at any time in his career as their Manager, had had an arduous and anxious task. He also bore testimony to the work of all the staff, both male and female.

Looking for Leakages at Sittingbourne.—During the past year considerable repairs have with good effect been carried out at the Sittingbourne Gas-Works and in the distribution department. Tests for leakages of gas have been systematically made, with satisfactory results; the loss having been reduced by nearly 5 p.ct. In consequence of further additional working costs, the prices for gas have of necessity again been increased. The accounts for the twelve months ended Dec. 31 showed a profit of £2788, and an unappropriated balance from the previous year of £1416. After making necessary deductions, there remained a disposable balance of £3548, out of which the Directors recommended dividends of 5 p.ct. on the original shares and 3½ p.ct. on the additional shares—leaving a carry-forward of £1278.

More Gas Sold at Reading.

The Directors reported at the annual meeting of the Reading Gas Company last Tuesday that, notwithstanding the difficulties of the times, the new 2 million cubic feet gasholder has been completed and brought into use. The growth of the Company's business points to the necessity of further extensions and improvements; but the Board have not, under existing conditions, felt justified in proceeding with these. The sale of gas increased during the year by 12,415,400 c.ft. (1·69 p.ct.), despite the restrictions in lighting. The number of consumers has risen to 20,556, an increase of 335. Owing to the advance in all charges connected with the manufacture and supply of gas, it became necessary to raise the price of gas from the Midsummer meter readings. Out of a pre-war staff of 297, 155 have joined the forces. The great loss sustained by the death of the Deputy-Chairman (Mr. H. B. Blandy, J.P.) was recorded in the report, and referred to at the meeting. A dividend at the maximum rate of 5 p.ct. per annum on the preference shares and ordinary stock was declared.

The Tunbridge Wells Engineership.

One of the principal matters referred to at the annual meeting last Wednesday of the Tunbridge Wells Gas Company was the change in the engineership. The Chairman (Alderman W. H. Delves, J.P.) said the Directors greatly regretted, owing to seriously impaired health, the resignation of Mr. Andrew Dougall, their Engineer and Manager. They all felt, however, that he was wise in his resolve to act upon his medical man's strong advice. They hoped he would quickly be improved in health, and soon quite restored. About seventy applications for the vacant post were received; and Mr. L. J. Langford, of Stoke, a gentleman of good reputation in the gas profession, had been appointed. Continuing, he remarked that the severe lighting restrictions had had a great effect upon the consumption of gas. He believed Tunbridge Wells had suffered more than most places, because they had no manufacturing trades there. During the last three months, however, there had been very satisfactory increases as compared with the corresponding days of last year. In the twelve months under review, the quantity of gas made was nearly 33 million cubic feet less than in the preceding year. The Directors had reluctantly decided to increase the price of gas 2d. per 1000 c.ft. from Lady-day next, making it 3s. The report was adopted, and dividends were declared at the rates of 12, 9½, and 9 p.ct. on the various classes of stock. Mr. Dougall, in acknowledging the kind remarks made respecting his retirement, said he had for 36 years been an officer of the Company; but it had been a very happy period, as he had had the good fortune to have a Board of Directors who had given him their confidence. This he had appreciated very much; and it had acted as a stimulus to him to do his very best for the Company. He hoped his successor would have the same experience. The parting would be a tremendous wrench; but it had to be done.

Gas-Works and the Tribunal.

When referring, at the annual meeting of the Newmarket Gas Company, to the difficulty that had been experienced in keeping up the supply of gas, Mr. R. Stephenson, J.P., D.L. (the Chairman), said they had lost many of their men at the beginning of the war, and men had been going ever since—as soon as a young man was old enough, he wanted to go. Their men had enlisted voluntarily extremely well; as a matter of fact, every man on the works was in a reserved occupation, and, whatever his age might be, could not be taken for the army unless Mr. J. H. Troughton (the Manager and Secretary) gave a certificate that he could be spared. Notwithstanding this, they had had to appeal for three men quite recently; and the exemptions given two of them were being appealed against by the representatives of the army. One of them was absolutely indispensable to them—he was one of the only two fitters on the works at the present time. If one of the two went, it would be impossible for the Manager or anyone else to be responsible for the safety of the town. It was a scandalous thing, in the opinion of the Directors, that an attempt should be made to take one, when there were only two fitters on such a large and important works as this. If there was any little accident in the town, fitters were required at once. If a couple of men could not be sent directly, accidents might happen, explosions might occur, and it would all be owing to the carelessness and thoughtlessness of those who tried to force out from a place like that men who were indispensable to the town. The Army Regulations were all right—they said these men should be left; but somebody else who did not read or understand his instructions persisted in trying to take the men away. Up to the present, he had not succeeded; but unless they took steps, wasted a day at Bury, and perhaps brought expert evidence, they might lose these men, and have the town in a state of non-safety. He mentioned this because if anything did go wrong in the town it would not be the fault of the Directors or Mr. Troughton, but the fault of some incompetent people who did not take the trouble to understand their duties, and were not willing to learn when people were prepared to tell them. He was speaking a little bit warmly, because he felt strongly on this point.

Air-Raid Warning in Edinburgh.—At the last meeting of the Edinburgh and Leith Gas Commissioners, Treasurer Chesser said that there were a good many people who were of opinion that the Germans were planning more Zeppelin raids on this country; and he wished to know whether the arrangements for warning the public by lowering the pressure of gas were still in existence. The Lord Provost assured the Treasurer that all the machinery was in readiness to be put into instant operation. On the suggestion of Bailie Lindsay, it was referred to the Works Committee to frame an advertisement for insertion in the local Press, reminding the inhabitants that the arrangements previously made for the lowering of the gas would be repeated in the event of a warning being received. The advertisement would be worded in such a way as not to cause the people undue alarm.

Cheltenham Gas Company.

The annual meeting of this Company was held last Thursday—Mr. R. Ticehurst presiding. In moving the adoption of the report and accounts, the Chairman said the amount of gas sold to private consumers had decreased by nearly 38 million cubic feet, compared with the preceding year. This was no doubt accounted for by the raising of the price to 2s. 9d. per 1000 c.ft., by the Daylight Saving Act, and by economies practised throughout the country. There had been an increase of £4644 in the cost of manufacturing gas, due to the advance in the price of coal, the extra cost of materials, and the increase in the payments to employees for war bonus, payments to dependants of men at the front, &c. Savings, on the other hand, had been effected to the amount of £2188. The half-yearly dividend to Dec. 31, at 5 p.ct., free of income-tax, was declared, and the Directors were re-appointed. As a measure of economy, it was resolved not to fill up any vacancy on the Board of Directors (through death) till after the war.

Half-Year's Working at Worthing.

At the meeting last Saturday, the Directors of the Worthing Gas Company reported that, for the six months ended Dec. 31, the sales of gas showed a slight increase over the corresponding period of 1915, notwithstanding the restrictions on lighting. The profit and loss account showed a balance of £23,121, out of which the Directors recommended the declaration of the statutory dividend at the rate of 5 p.ct. per annum, less income-tax, upon the consolidated ordinary stock of the Company. Particulars of the working and financial results prepared by Mr. S. O. Stephenson (the Engineer and General Manager) show that the total gas sales amounted to £16,536, as against £16,359 in the previous corresponding half year. There was an increase of £155 in rentals for meters, stoves, and prepayment fittings. For tar, £169 more was received; and as the contract price for the surplus tar was below that of the preceding year, the increased return was entirely due to the sale of dehydrated tar, the cost of the plant for which was £510. The gross cost of coal worked out at 29s. 5d. per ton, as compared with 26s. 2½d. The gas sold was 10,962 c.ft. per ton of coal carbonized. The business prospects of the Company are good; and the orders for gas-fires, water-heaters, and other gas appliances have been almost greater than it has been possible to cope with. The net cost of gas into the holder for the past half year was 1s. 9d. per 1000 c.ft., as against 1s. 6d. in 1915.

More Gas Sold at Southend.

It was reported by the Directors at last week's meeting of the Southend Gas Company that there had been an increase in the quantity of gas sold in the past six months, as compared with the corresponding half of last year, equal to 3·18 p.ct. The number of consumers totalled 19,187, of whom 13,913 were automatic consumers. The increased cost of coal was £4743, which was only £51 16s. 11d. less than the amount represented by the increased selling price of gas (4d. per 1000 c.ft.) received during the half year; but against this substantial increases were shown from sales of residual products. After charging to the renewal fund account the sum of £500, placing £250 to capital redemption fund, and providing for the payment of interest charges, there remained a balance of £7233 available for dividend. It was recommended that these be paid on the original and new ordinary stocks at the rate of 5¼ p.ct. per annum, and on the new ordinary "B" stock at the rate of 4⅛ p.ct. per annum (all less income-tax at 5s. in the pound), which would leave £1253 to be carried forward. The Chairman (Mr. J. H. Burrows, J.P.) emphasized the gratifying feature which the increased sale of gas presented, and said another bright spot was that residuals had increased by over £2700. Coal had cost them—though they had tried to buy in the cheapest markets—over 5s. 10d. per ton more than it did in the same half of the previous year; and in spite of the increase in the selling price of gas, they would have been in an unpleasant situation if it had not been for the fact that for every ton of coal carbonized they had registered a sale of 800 c.ft. more gas. The Directors expressed their gratitude to the Engineer and Manager (Mr. C. S. Shapley), and hoped for still better results this year. In spite of the difficulties, the half year has been one of the best on record—at any rate, the best since the war broke out. He had referred to the Engineer and his work; and he wished to add that not only the Board, but the shareholders as well, were indebted to the Secretary (Mr. J. T. Randall) for constant, self-sacrificing, and painstaking energy.

Increased Sales at Weston-super-Mare.—In the case of this Company, the Directors' report for 1916 was to the effect that the sales of gas show an increase over the previous twelve months of 5,684,900 c.ft., or 2·30 p.ct., which they consider extremely satisfactory. The Directors have decided to write-off £4000 against capital expenditure for the value of obsolete plant at the old works. At the request of the Government, the Company are extracting benzol and toluol from the gas. The Directors recommended the payment of the maximum dividend of 5 p.ct. on the ordinary stock for the half year ended Dec. 31, less income-tax. The Company have applied to the Board of Trade for an Order under the Gas (Standard of Calorific Power) Act, 1916; and the Order has been granted.

Gas Consumption at Canterbury.—The sale of gas for the year 1916, it was reported by the Directors of the Canterbury Gas and Water Company at the annual meeting, showed a decrease of 15,980,400 c.ft., as compared with the previous year. This was due chiefly to the Summer Time Act, shop-lighting restrictions, and the number of troops quartered in the city being less than in the corresponding period. But notwithstanding this decrease, the quantity of gas sold, when compared with the pre-war period of 1913, exhibited an increase of 11,676,700 c.ft. After payment of the interest on loan capital, there was a net profit on the combined undertakings of £10,053. An interim dividend of 4 p.ct. having been paid in August, the Directors recommended a further dividend of the same amount, less income-tax, making 8 p.ct. (being the full statutory dividend) for the year.

Edinburgh Gas Annuities.

In a recent report by the Treasurer to the Edinburgh and Leith Gas Commissioners (Mr. A. Canning Williams), he suggested that, as there was an uninvested sum standing at the credit of the annuities sinking fund, he should be authorized to issue a circular letter offering to purchase annuities, to the extent of the money available, at the price of £20 per £1, and so give the holders an opportunity of investing the proceeds in the War Loan. It is understood that the compulsory redemption price is £28 10s. per £1, and that up to 1910 the average cost of annuities purchased in the open market exceeded this figure. Since that year, however, the value of the annuities has fallen; the decrease being specially marked since the war began. In a letter to the Commissioners, Mr. Williams stated that he had 66 offers to sell; and that he was able to accept 34 of them. He explained that these annuities, which stood in the books at £10,039, had been acquired at a cost of £7045, thus improving the financial position of the undertaking by £2994; and that, from assurances given him, a large part of the purchase-money had been invested in the War Loan—the yield being slightly more than that obtained from the annuities. Mr. Williams added the following rather striking statement: "At May 15, 1910, the amount paid for Edinburgh and Leith annuities redeemed up to that date was £1796 in excess of their value as shown in the books; to-day the amount paid in redemption of these annuities is £18,612 less than their capitalized value—hence the financial position of the undertaking, since 1910, has been improved in this respect by the large sum of £20,408."

Wellington (Salop) Gas Company.

The annual report and balance-sheet which were adopted at the recent meeting of the Company showed that the revenue was £11,435, and the expenditure £8690, leaving a surplus of £2745. The lighting restrictions and the Summer Time Act had brought about a reduction in the sale of gas of 14½ p.ct.; but the loss of revenue occasioned thereby had been satisfactorily met by higher receipts from the sale of coke, improved working results, and economies effected in several directions. It was proposed to declare a dividend for the six months ended Dec. 31 at the rate of £5 5s. p.ct. per annum—making, with the interim dividend, £5 2s. 6d. p.ct. (less tax) for the year. The position of the Company fully justified a lowering of the price of gas for lighting, cooking, and heating purposes by 2d. per 1000 c.ft. as from Jan. 1, entitling the proprietors to an increased dividend over the current year of 5s. p.ct. Early in 1916 the Directors thought it expedient to insure against damage or destruction by aircraft, and a policy was accordingly effected with Lloyds, covering not only works and plant, but loss of profits also. Mr. R. J. Milbourne, returning thanks for his re-election as a Director of the Company, said it was at the present time somewhat of a honour to be a director of a gas company, seeing that they had undertaken so much work of conspicuous national importance. He noticed at a meeting a few weeks ago it was stated that no less than 40 p.ct. of certain products required by Government for munition purposes had been recently supplied by the gas companies. Although the war had done much to depress stocks generally throughout the country, it was very remarkable that gas securities had not suffered so much as other undertakings, and he did think that, after the war, when they returned to normal times, the price of gas stock generally would be very much improved.

A Good Record at Redhill.

In the report which was adopted at the recent annual meeting of the Redhill Gas Company, the Directors, dealing with the year 1916 stated that the lighting restrictions, and the operation of the Summer Time Act, had temporarily diminished the demand for gas. The consumption, however, had been considerably in excess of that of 1914. The accounts admitted the payment of a dividend at the standard rates under the sliding-scale—namely, 9½ p.ct. on the share capital, and 4¾ p.ct. on the ordinary "B" stock, less income-tax. This would leave a balance of £1019 to be carried forward. The Chairman (Mr. G. R. Hunt) said that, partly owing to better working results, and to a smaller extent due to the temporary reduction in the demand for gas—amounting to 7 p.ct.—they used 334 tons of coal and 34,077 gallons of oil less than the previous year. Notwithstanding this, coal and oil cost £657 more than in 1915; while maintenance of works, meters, and stoves all showed advances, in consequence of the higher cost of materials and labour. The gas-rental reflected the diminished demand; but this decrease was neutralized by better proceeds from residual products, so that on Dec. 31 they were in practically the same financial position as at the end of 1915. Toward the close of the year it became evident that a continuance of such conditions was impossible. Despite the Price of Coal (Limitation) Act, which appeared to be practically a "dead letter," the Company had to contract for their requirements of coal at prices above those ruling during the greater part of 1916; and, to partly meet this increased expenditure, the Directors, with great reluctance, advanced the price of gas 2d. per 1000 c.ft. from Jan. 1 last. Even so, the present charge was only 10 p.ct. above that ruling in June, 1914, though coal had advanced 65 p.ct. since that date, and gas oil to-day could only be purchased at three times the usual price. During the last few days they had put to work oil-washing plant—constructed entirely by their own staff—for the recovery of benzol. It had been a very trying time; and without the assistance they had received from their Engineer and General Manager (Mr. W. H. Bennett) they could not have done what they had. He had a splendid staff.

Brynmawr and Blaina Gas Company.—Consequent on the great increase in the cost of coal, labour, and materials, with the decreased consumption of gas during the past year, the Directors at the shareholders' meeting last Wednesday did not deem it prudent to recommend the payment of a dividend on the ordinary stock, but hoped that the withholding of a dividend would only be of a temporary character. They recommended the usual dividend on the 5 p.ct. cumulative preference stock.

Salford Corporation Gas Examiner for "Out" Districts.—At the last meeting of the Salford Gas Committee, Professor Harold B. Dixon, M.A., Ph.D., F.R.S., of Manchester, was appointed Gas Examiner for testing the gas supplied in 1917 to consumers in the districts of Eccles, Swinton, and Pendlebury, in accordance with the Salford Corporation Act, 1897.

Complaints at Shipley.—Complaints having been received with regard to the quality of the gas supplied at Shipley, the Acting Engineer (Mr. H. Higham) pointed out that the trouble arose from naphthalene deposits in the mains and frozen syphons, due to the keen frost; but the difficulties were being overcome. He also urged that the flat-flame burner could no longer be relied upon to give any satisfaction in lighting; but as the heating value of the gas was very little reduced, when it was used for incandescent burners, cookers, and gas-fires it was quite satisfactory. Mr. A. Waugh (Chairman of the Gas Committee) told the Council that the trouble was being got over by using solvene; but it had been difficult to obtain supplies.

A "Military Age" Appointment Discussed at Keighley.—When there came up for consideration by the Keighley Town Council a recommendation of the Gas Committee that Mr. H. B. Holliday, of Ilford, be appointed assistant at the gas-works, at a commencing salary of £150 per annum, rising by two annual increments of £25 to £200, Mr. Brigg inquired whether he was under military age. Alderman Harrison replied that he was; but the Committee did not think there would be any fear of him being called up, in view of the nature of his occupation. Mr. Murgatroyd expressed the opinion that, in the present circumstances, it would be practically impossible to get a man for the position who was over military age. The selection was made with the greatest care by the Committee. Alderman Harrison added that the Committee were convinced they had got the best man who came before them. An amendment by Mr. Brigg that the recommendation be referred back to the Committee was lost—seven members voting for it, and thirteen against.

Cork's High Freight Charges.—Referring, at the meeting of the Cork Gas Company, to the problem of increased costs, the Chairman (Mr. W. B. Harrington) said the adverse conditions under every item of expenditure—labour, coals, freights, &c.—continued; and there were, he regretted to say, no signs of any immediate improvement. On the contrary, the tendency was the other way; and only quite recently they had had to pay no less than 25s. per ton freight from the East coast, which was the highest they had ever paid. The report of the Directors stated that, as compared with the corresponding half of 1915, the accounts showed a small decrease in the consumption of gas. This was accounted for by economy in the general private and public lighting. The latter was due to the lighting of a smaller number of lamps, which were in use for shorter hours. The cost of production continued very high. The balance of profit and loss was £2987, after placing £200 to the depreciation fund. They proposed to pay a dividend at the rate of 6 p ct. per annum, which would amount to £3290; and for this they required £303 to be taken from the reserve fund.

Women Workers in Glasgow.—The "Bulletin," a Glasgow illustrated paper, has published some photographs showing the good work that women are doing for the Glasgow Corporation Gas Distribution Department. They are seen employed in the brass shop, testing meters, and in the fire and cooker repair section. Mr. Ralph Halkett (the Commercial Superintendent) states that there are at present 200 women engaged in the gas distribution and sales departments—130 as meter-readers, 30 as clerks, and 40 as repairers of stoves, fires, and meters.

Gloucester Gas Company.—The Directors, dealing with the past half year, reported at the recent meeting of the Company that, largely owing to the lighting restrictions, the sale of gas had somewhat diminished, especially for street lighting. The receipts from coke, however, showed a satisfactory advance. Application is being made by the Company to the Board of Trade for an Order under the Gas (Standard of Calorific Power) Act, 1916. Payment of the maximum statutory dividend of 5 p.ct. per annum on the consolidated stock was recommended. The accounts indicated that sales of gas realized £23,465, as against £24,823 in the corresponding half of 1915.

Garw and Ogmore Company's Dividend Passed.—For the past twelve months, the revenue account of the Garw and Ogmore Gas Company shows a profit of £1425. Adding £341 brought forward, and deducting debenture and other interest, the half-year's preference dividend to June 30, 1916, and £200 carried to suspense account for abandoned works, there is a balance to carry forward of £147. The Directors regret that, owing to the continued high charges for coal, labour, and all material, the profits are not only insufficient to pay a dividend on the ordinary shares, but they are also unable to recommend any further payment of dividend on the preference shares. The limitation on the price of gas will, they say, make it impossible under existing conditions to earn profits sufficient to pay dividends, unless they can gain relief through revision of their Acts in respect to price. The Directors are accordingly taking what steps they can.

Longwood and Slaithwaite Gas Company.—In moving the adoption of the report and accounts at the annual meeting of the Company, Mr. Robert Thornton (the Chairman) said the year had been an exceptional one. The amalgamation of the two concerns had made practicable the erection of new up-to-date plant, upon which the Directors and the Managers had exercised the greatest forethought. The plant was in operation; and they believed it would prove successful. A portion of the expenditure had been placed to a suspense account for works replacement. The output of gas had decreased by about 15 million cubic feet, which was entirely attributable to the lighting restrictions and the Summer Time Act. Very few people had complained about the increase in meter-rents; but these had been too small for several years past. The interest and depreciation of an ordinary household meter cost over 1s. per quarter, which compared favourably with the present rental of 10d. The report was adopted; and the statutory dividend was declared for the year at the rate of £4 18s. 9d. p.ct. on the Longwood stock, and £4 8s. 9d. p.ct. on the Slaithwaite stock.

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Electricity "General Manager" at Manchester.—Commenting upon the fact that the Manchester Electricity Department has followed the example of the Tramways Department by appointing a "General Manager" in Mr. S. L. Pearce, the present Engineer, a Manchester newspaper says: "The question is now being asked whether a very useful purpose would not be served if the Gas and Water Department followed suit. The subject is worth considering."

Fatality at a Manchester Gas-Works.—A verdict of "Accidental Death" was returned at an inquest, last Monday week, on William Williamson, aged 54, a gas-works labourer, who was crushed between a stationary and a moving crane at the Rochdale Road works. Several of the man's ribs were broken; but after the accident he complained only of having hurt his shoulder, and continued to work for two or three days. Death was due to pneumonia, set up by the fractured state of the ribs.

Cost of Coal at Harwich.—As compared with before the war, the cost of coals last year averaged 12s. 8d. per ton increase at Harwich. This was one of the points made by the Chairman (Mr. H. J. W. Jervis) at the annual meeting of the Gas Company. The general working of the Company, he added, justified them in paying a dividend 1 p.ct. less than last year; but the Board considered it better to conserve their resources, rather than to distribute them in these times. The best freight offered for the type of vessel that could come alongside their quay amounted to 22s. 6d. per ton from the North. The Directors' report stated that the price of gas had been increased by a further 6d. per 1000 c.ft. as from Jan. 1. An interim dividend of 3 p.ct. on the original capital, and £2 2s. p.ct. on the additional capital was paid in August; and the Directors recommended a final dividend of 4 p.ct. on the original capital, and £2 16s. p.ct. on the additional capital, making 7 and £4 18s. p.ct. respectively for the year.

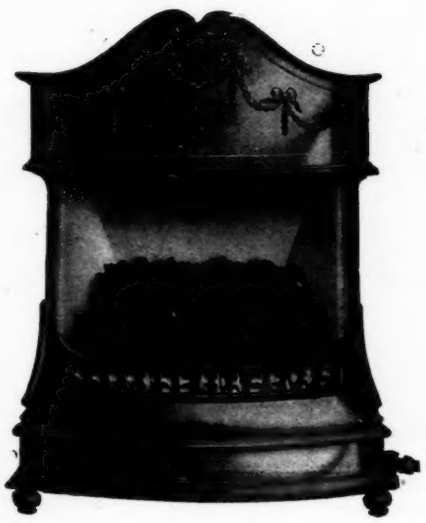
Whitby Gas Company.—In the course of his remarks at the annual meeting of the Company, the Chairman (Mr. Freeman Richardson) said that for the third time they met under conditions imposed by the continuation of the war, which had affected all gas companies adversely. The increased severity of the lighting restrictions, and the almost unprecedented visiting season, had further reduced the sale of gas for lighting and cooking by about £500. The receipts from coke, however, had increased by about £150, though other residuals showed a diminution of £130. The gross receipts were £418 less on the year. On the expenditure side, the cost of coal showed an increase of £200, repairs and maintenance a reduction of £328. The result of the year's trading allowed of carrying £2117 to profit and loss, as against £2090 for the previous year. The dividends would absorb £918, leaving £253 to be carried forward. These figures conveyed, more than any words of his could do, the anxieties through which the management and staff had passed. The Directors thought the results not at all unsatisfactory, when all the circumstances were considered. The report was adopted, and dividends were declared at the rate of 6 p.ct. per annum on the original and £4 4s. p.ct. per annum on the additional and new additional capital.

Marking Time at Romford.—In their report for the six months ended Dec. 31, the Directors of the Romford Gas Company state that the revenue profit carried to the profit and loss account is £3856; and adding the balance brought forward makes an available total of £8300. After providing for interest charges and income-tax, there remains a net balance of £7048. Out of this, the Directors recommend dividends of 6¾ p.ct. on the original shares and 5¼ p.ct. on the "B" shares, both less income-tax. This will leave £3955 to be carried forward. The sale of gas has been practically the same as during the corresponding period of 1915; the slight diminution representing only 0·06 p.ct. The Directors regret that, owing to the continued increase in working costs, they have been compelled to advance the price of gas 3d. per 1000 c.ft., as from Christmas last.

Theft from the South Metropolitan Gas Company.—Frederick J. Wright, a labourer, of Deptford, was charged at the Greenwich Police Court, on Friday, with stealing a quantity of lead piping, valued at 20s., the property of the South Metropolitan Gas Company, from Phœnix Wharf, East Greenwich. Mr. Passmore (who prosecuted) said prisoner had been employed at the wharf for three weeks; but he did not appear to be a very assiduous workman, for, while his wages had averaged £2 3s. in one week, when he made full time he earned £2 18s. 10d. On Thursday afternoon, a watchman observed that under his overcoat prisoner appeared very bulky, and that below the overcoat some lead piping was protruding. The prisoner said he had found the lead. The Company, Mr. Passmore added, had been subjected to such depredations for a considerable time; and they felt that, unless an example was made, it was impossible for them to carry on their business satisfactorily. The prisoner, who said he was under the influence of drink at the time, was sent to prison for two months, with hard labour.

Tribunal Case at York.—At a sitting of the York Local Tribunal, the Military Representative asked for the review of the certificates of three employees of the Gas Company—two gas-fitters engaged outside the works, and a time-keeper who is also a meter-tester and gas-fitter. Mr. H. E. Bloor (the Manager) said that in June, 1914, in one department 97 men were employed, and they had been reduced to 35. In 1914, there were 38 gas-fitters; whereas to-day there were only 17. Of the latter, two-thirds were of military age. They were getting to a point when the taking of more men would be extremely dangerous to a concern of their size. At present, the Company were not spending one-half of the money they ought, to keep the plant in proper repair. Consequently there must be escapes of gas. Plumbers were absolutely no use to them. The Lord Mayor: Perhaps not; but householders frequently call them in to attend to escapes. Mr. Bloor: The matter is a very difficult one to argue with an untechnical body. My arguments had a good deal of influence with the authorities; and the Government Departments are now considering the matter in conjunction with the National Gas Council. The Tribunal withdrew the certificates of all three men; the Military Representative agreeing not to call up for a month one of them whom Mr. Bloor said was irreplacable.

The "Fire Queen"



The Latest "Main" Gas Fire.

It is designed to co-ordinate in size with *any* modern Interior Grate.

The fire backs and heights over-all are graded to coincide with the dimensions of Standard Grates. Note the appearance when in use. So like a bright coal fire, and it will pass all the "tests" for Efficiency and Ventilation.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Gas Economizer Inventor Fined.—At the Dublin Southern Police Court, Nicholas Shulock, a carter, was sent to gaol for two months for stealing a ton of breeze from the premises of the Alliance and Dublin Consumers' Gas Company; and Peter O'Byrne, who was shown to have recently invented a "gas economizer," was fined £5, and his wife was also called upon to pay the sum of 40s. for having the breeze in their possession.

Dublin Gas Exhibition.—The Alliance and Dublin Consumers' Gas Company's furnace and heating exhibition closes to-morrow, the 7th inst. As anticipated, it has proved a great success, and installations of gas for industrial uses are likely to result in Dublin and in certain provincial towns. Last week members of the Institution of Civil Engineers were among the visitors; and they expressed themselves greatly interested in all they saw and heard in relation to the value of gas for heating purposes.

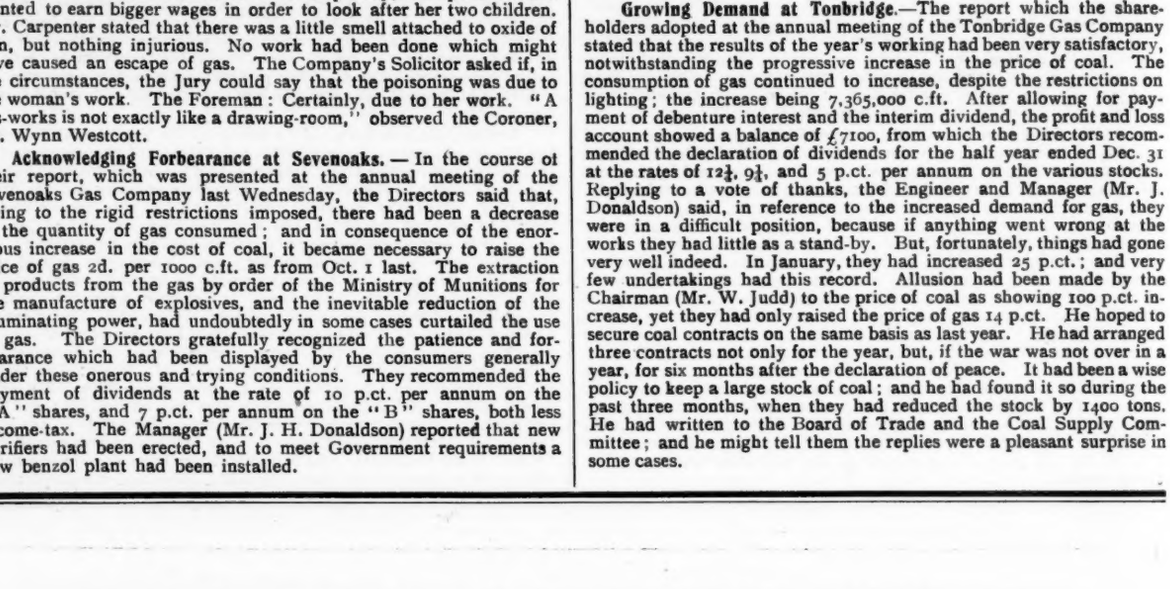
Woman Gas-Worker Poisoned.—"Gas poisoning by misadventure" was the verdict of a Hackney Jury on Saturday, in the case of a widow named Godfrey, 45 years old, who was employed at the Gas Light and Coke Company's works, at Bow Common Lane. She was one of the women substitutes for men, who, said the Resident Engineer, Mr. A. Carpenter, were being introduced. She was a "turner over" of oxide of iron. Her father stated that she had complained of the smell; and when he advised her to keep away, she replied that she wanted to earn bigger wages in order to look after her two children. Mr. Carpenter stated that there was a little smell attached to oxide of iron, but nothing injurious. No work had been done which might have caused an escape of gas. The Company's Solicitor asked if, in the circumstances, the Jury could say that the poisoning was due to the woman's work. The Foreman: Certainly, due to her work. "A gas-works is not exactly like a drawing-room," observed the Coroner, Dr. Wynn Westcott.

Acknowledging Forbearance at Sevenoaks.—In the course of their report, which was presented at the annual meeting of the Sevenoaks Gas Company last Wednesday, the Directors said that, owing to the rigid restrictions imposed, there had been a decrease in the quantity of gas consumed; and in consequence of the enormous increase in the cost of coal, it became necessary to raise the price of gas 2d. per 1000 c.ft. as from Oct. 1 last. The extraction of products from the gas by order of the Ministry of Munitions for the manufacture of explosives, and the inevitable reduction of the illuminating power, had undoubtedly in some cases curtailed the use of gas. The Directors gratefully recognized the patience and forbearance which had been displayed by the consumers generally under these onerous and trying conditions. They recommended the payment of dividends at the rate of 10 p.ct. per annum on the "A" shares, and 7 p.ct. per annum on the "B" shares, both less income-tax. The Manager (Mr. J. H. Donaldson) reported that new purifiers had been erected, and to meet Government requirements a new benzol plant had been installed.

Management of the Dumbarton Gas-Works.—A public meeting has been held in the Burgh Hall, Dumbarton, to discuss the dismissal of the Gas Manager. Speeches were made by Bailie Lawrence and Councillor Roger, after which a resolution was moved calling on the Gas Committee to agree to the appointment of an expert to inquire into the whole position. The meeting also strongly protested against the appointment of a new Gas Manager, in face of public opposition; and it was agreed to forward to the Gas Manager of Kirkintilloch, to whom the position had (as recorded elsewhere in this issue) been offered, a notification of the request for an inquiry. A motion was carried that the Gas Committee resign.

Testing Apparatus at Bridlington.—At a meeting of the Parliamentary Committee of the Bridlington Town Council, a letter was received from the Secretary of the Gas Company, stating that he had received a copy of the Bridlington Gas (Standard of Calorific Power) Order, 1917, and asking the Council to come to an agreement with the Company with respect to the apparatus for testing the calorific power of the gas. Subsequently the Committee had an interview with Mr. John Kelly (the Secretary); and the Town Clerk obtained information from certain other towns with respect to calorimeters. As the result, the Committee decided to enter into an agreement with the Company that the apparatus employed should be the Simmance patent total-heat calorimeter.

Growing Demand at Tonbridge.—The report which the shareholders adopted at the annual meeting of the Tonbridge Gas Company stated that the results of the year's working had been very satisfactory, notwithstanding the progressive increase in the price of coal. The consumption of gas continued to increase, despite the restrictions on lighting; the increase being 7,365,000 c.ft. After allowing for payment of debenture interest and the interim dividend, the profit and loss account showed a balance of £7100, from which the Directors recommended the declaration of dividends for the half year ended Dec. 31 at the rates of 12½, 9½, and 5 p.ct. per annum on the various stocks. Replying to a vote of thanks, the Engineer and Manager (Mr. J. Donaldson) said, in reference to the increased demand for gas, they were in a difficult position, because if anything went wrong at the works they had little as a stand-by. But, fortunately, things had gone very well indeed. In January, they had increased 25 p.ct.; and very few undertakings had this record. Allusion had been made by the Chairman (Mr. W. Judd) to the price of coal as showing 100 p.ct. increase, yet they had only raised the price of gas 14 p.ct. He hoped to secure coal contracts on the same basis as last year. He had arranged three contracts not only for the year, but, if the war was not over in a year, for six months after the declaration of peace. It had been a wise policy to keep a large stock of coal; and he had found it so during the past three months, when they had reduced the stock by 1400 tons. He had written to the Board of Trade and the Coal Supply Committee; and he might tell them the replies were a pleasant surprise in some cases.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Corner of one of the largest Hardening Shops in the Country. Completely equipped with "Richmond" Furnaces. Whatever heat-treating proposition is under consideration, there is a "Richmond" Furnace to suit the class of work.
THE RICHMOND GAS STOVE & METER CO., Ltd.
WARRINGTON & LONDON.

Monifieth Gas Management.—A special meeting of the Monifieth Town Council was held last week to consider the working of the gas undertaking. A letter was submitted from the Gas Manager resigning his position; but the Town Clerk intimated that, before entering the meeting, he had received another letter withdrawing the resignation. At this stage, Bailie White moved that they meet in committee, as he did not think they could discuss the matter with representatives of the Press present. This course was agreed to.

Newmarket Gas Company.—The net balance of profit earned by the Company during the year 1916 was £3744, which, after deducting debenture interest £162, and adding £3222, the balance brought forward, made the sum of £6803, from which had to be deducted £950 written-off investments on Dec. 31 for depreciation, leaving a balance standing at the credit of the profit and loss account of £5853. The Directors recommended at last week's meeting a dividend at the rate of 6½ p.ct. for the year on the original consolidated stock, less income-tax, which would leave £2947 to be carried to the next account. The Chairman (Mr. R. Stephenson, J.P., D.L.) said they had had a quite satisfactory year, partly due to the fact that there had been troops in the district. As a matter of fact, Mr. J. H. Troughton, the Manager and Secretary, had had considerable difficulty all through the season in keeping up the supply of gas owing to the depleted staff.

Salford and the Calorific Standard.—At the last meeting of the Salford Town Council, several important matters concerning the Gas Department were touched upon, the chief of these being the decision of the Gas Committee to recommend the Council to make application to the Board of Trade for a Calorific Standard Order. Alderman F. S. Phillips, J.P. (the Chairman of the Gas Committee), having assured the members that it was not proposed to change the character or quality of the gas at present supplied by the Corporation, the resolution was carried without further comment.

Effect of Lighting Restrictions at Chichester.—The proprietors of the City of Chichester Gas Company were informed by the Directors in their report that during the past half year the lighting restrictions had again affected the sale of gas, to the extent of 6 p.ct.; but the Board had reason to think that the limit in this respect has been reached, and that in future there will be increases to report. Coal was again higher in cost; but the improved prices realized for residuals partly met this. The balance standing to the credit of the profit and loss account amounted to £1666, out of which the Directors recommended the declaration of a dividend for the half year at the rate of 5 p.ct. per annum upon the "A" capital stock, and 3½ p.ct. per annum on the "B" and "C" capital stocks, all less income-tax. These would absorb £783.

STOCK MARKET REPORT.

THE War Loan excitement and tension is over at last. The eager public have had from the Chancellor the sensational figures they were longing for, and even a good deal more than the most optimistic imagination had dared to soar to. Only the echo of the jubilant shouting is left; and that is dying away and leaving the financial atmosphere clear for resumption of "business as usual."

Quietude has settled down on the Stock Exchange, and business last week was upon a very reduced scale, the chief causes for which have already been adverted to in this column. On the one hand, so freely were securities realized in order to provide funds wherewith to take up the War Loan that there is now a genuine scarcity of stock in the markets; while, on the other hand, people have gone into the loan with all their available means, and are not ready yet to come into markets as buyers, even at tempting prices. In the result, last week was a dull one in most quarters. A conspicuous exception was the gilt-edged market. Home Government were very strong, the old War Loan and Consols being in good demand, and Colonial issues were a good second. Home Rails were little dealt in, and shrank, but were disposed to steady a bit before the close. Americans were quite under a cloud, and Argentines were thoroughly depressed by bad traffics and dark prospects. The South African Market was among the firmest. The Foreign Market was dull for the most part. Some little buying kept Chinese and Japanese from dropping; but others were not so fortunate. Rubber shares were very firm; dividend announcements and expectations being bright. Oil concerns were steadier. Shipping and Textiles were dull.

Business in the Gas Market was rather more animated, and was better distributed over the list of undertakings. Movements in prices were irregular, and some perhaps a little capricious apparently. On the whole, there were about as many variations in the one direction as in the other. In the Money Market, conditions ru'ed easy. The present Committee of the Stock Exchange still set their faces against a closed Saturday. Changes of *personnel* and of views may result from the forthcoming election.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 69, 69¼, 69⅜, ditto preference 68¼, 68⅜, Primitiva preference 61s. 3d, South Metropolitan 75. On Tuesday, Aldershot preference 60, Brentford "A" 83⅛, 84, Gas Light ordinary 69, 69¼, 69⅜, ditto debenture 54½, South Metropolitan 74⅛, 74⅜, 75. On Wednesday, Aldershot preference 61, Brentford "B" 82, 82½, ditto debenture 67, 67¼. Continental Union 36¼, Gas Light ordinary 68, 68½, 68⅜, 68⅞, 69¼, Imperial Continental 69, 69½, Oriental 105, Primitiva 40s., 40s. 4½d., South Metropolitan 75¼. On Thursday, Metropolitan of Melbourne 99, Monte Video 8 1/16, 8 1/16, Primitiva debenture 79⅜, 79½, South Metropolitan 74½, South Suburban 80½, Southampton 78, 78½, Tottenham debenture 70. On Friday, British 33⅝, 34 1/16, European 9⅛, 9 9/16, 9⅜, Gas Light ordinary 68, 68½, Monte Video 8⅛, Primitiva 40s., ditto preference 57s. 6d., South Metropolitan 74½, 75¼. On Saturday, Gas Light ordinary 67½, 68, 68¼, ditto maximum 55, 55½, ditto debenture 64½, Melbourne 98¾, Monte Video 8 1/16.

The Bank rate is 5½ p.ct., as fixed on the 18th of January.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	60–65	60–61
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59–64	62–64	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76–79	58–63	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞–6⅛	4⅜–5⅛	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water: 10 p.c.	29–30	25–27	..
383,110	10	,,	7	7/-	Bournemouth Gas and Water: B 7 p.c.	15–15½	11–11½	..
115,000	10	,,	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13½–14	9½–10	..
159,740	—	,,	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	71–78	..
992,045	Stk.	Feb. 26	14	55/-	Brentford A Consolid.	261–266	83–85*	83½–84
734,920	,,	,,	11	53/9	Do. B New	204–209	80–83*	84–82½
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109–111	83–88*	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91–93	67–69	67–67½
217,380	,,	Feb. 26	11	10%†	Brighton & Hove Orig.	208–213	160–165	..
244,200	,,	,,	8	7%†	Do. A Ord. Stk.	154–159	115–120	..
530,000	20	Mar. 26	12½	22/6	British	44–45	33½–34½	33⅞–34 1/16
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88–90	66–68	..
245,771	,,	,,	4	4%	Buenos Ayres 4 p.c. Deb.	85–87	57–60	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½–2½	1½–1⅞	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4–6	4½–5	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70–75	58–63	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108–110	79½–80½*	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	105–108	71–73*	..
560 000	,,	,,	5½	46/8	Do. 3½ p c. do.	103–105	69–68*	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½–71½	52–54	..
800,000	,,	,,	4	—	Continental Union Ltd.	76–79	35–38	36½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115–118	58–60	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	175–185	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅜%†	Derby Con. Stk.	123–125	100–105	..
55,000	,,	—	4	4%	Do. Deb. Stk.	103–104	80–83	..
1,002,180	10	July 29	10	7/6	European, Ltd.	17½–18	9–10	9½–9⅝
16,313 430	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke: 4 p.c. Ord.	98–102	67–69*	67⅝–69½
2,600 000	,,	,,	3½	3½%	Gas Light and Coke: 3½ p.c. max.	76–79	54–56*	55–55⅜
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	93–99	67–69*	68½–68⅝
4,674 850	,,	June 11	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½–74½	54–56	54½
130,000	,,	,,	10	10%	Gas Light and Coke: 10 p.c. Bonds	..	..	..
2'8,740	,,	Mar. 12	5	4½%†	Hastings & St. L. 3½ p.c.	87–89	78–83	..
70 000	10	April 29	11	6%	Hongkong & China, Ltd.	16½–16¾	8–9	..
26,600	—	—	—	9½%	Hornsey 7 p.c.	..	125–135	..
131,000	Stk.	Mar. 12	7⅛	7.%	Ilford A and C.	151–154	105–110	..
65,780	,,	,,	6⅛	5⅛%	Do. B	115–118	82–87	..
65.500	,,	June 26	4	4%	Do. 4 p.c. Deb	92–94	71–74	..
4,910,000	,,	May 14	9	4½%	Imperial Continental	150–160	68–73	69–69½
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84–86	58–61*	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p c.	119–121	87–92	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A	211–213	80½–82½*	..
					Liverpool 5 p.c. Ord. B	146–148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	72–74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛–4⅜	3⅝–4⅛	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99–101	98–100	98½–99
541,920	20	May 23	4	6/-	Monte Video, Ltd.	11½–12	8–8½	8 1/16–8 3/16
1,875,892	Stk.	July 29	4½	4½%	Newcastle & Gateshead Con.	98½–99½	73½–74½	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82–83	75–75	..
55,940	10	Feb. 25	7,14/0	7,7,†	North Middlesex 7 p.c.	14–15	10⅝–11⅛	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117–122	104–106	105
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼–7½	2–3	..
60.000	50	Feb. 26	13	12%	Portsea, Island B	128–131	92–97*	..
100,000	50	,,	12	11%	Do. C	118–121	85–90*	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛–6	1 7/8–2⅛	40/–40/4½
499,960	5	June 26	5	2/6	Do. 5 p.c. Pr f.	4⅝–5	55/–65/-	57 6–61/3
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91–93	73–80	79⅝–79½
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85–87	61–67	..
150,000	10	May 14	6	6/-	San Paulo 6 p.c. Pref.	10½–11	8–8½	..
125,000	50	July 1	5	5%	San Paulo 5 p.c. Deb.	47–49	42–44	..
135,030	Stk.	Mar. 12	10	10%	Sheffield A	223–224	188–192	..
200,934	,,	,,	10	10%	Do. B	223–224	183–192	..
523 530	,,	,,	10	10%	Do. C	220–222	188–190	..
90,000	10	May 28	9	6/-	South African	10½–11½	..	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8†	South Met. 4 p.c. Ord.	111–113	74–76*	74½–75½
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	73½–74½	54–56	..
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157–159	144–146	..
952,795	,,	,,	6	48/4	S'th Suburb'n Ord. 5 p.c.	114–116	80–82	80½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110–112	79–81	..
135.000	,,	,,	—	48/4	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p c. Deb. Stk.	116–118	88–90	..
647,740	,,	May 14	5	5%	Southampton Ord.	99–102	77–79	78–78½
120,000	,,	Feb. 12	7½	7½%	Tottenham District: A 5 p.c.	135–138	95–100*	..
782,275	,,	,,	6	5⅞%	Tottenham District: B 3½ p c.	115–117	68–73*	..
181.255	,,	June 26	4	4%	Tottenham District: 4 p.c Deb.	87–89	65–67	70
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5–6	1–2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93–95	60–65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p c. max.	103½–109½	91–92	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅔	80/-†	Wandsworth A 5 p.c.	151–156	117–122	..
255 636	,,	,,	6⅔	65/-†	Do. B 3½ p c.	129–134	101–103	..
108,075	,,	,,	5/17/8	56/-†	Do. C 3½ p.c.	110–115	88–93	..
352,000	,,	,,	6⅔	58/9†	Wimbledon 5 p.c.	117–122	90–95	..
98,000	,,	,,	6⅔	65/-†	Epsom 5 p.c.	121–126	98–103	..
88,416	,,	June 26	3	3%	3 p c. Deb. Stk.	66–69	51–54	..

* Ex. div. † Next dividend will be at this rate.

Harrogate Calorific Standard Order.—At the request of the Ministry of Munitions, a plant has been erected by the Harrogate Gas Company for the recovery of benzol; and the Board of Trade have granted the Company an Order substituting a calorific standard for the illuminating power standard. These facts were set forth in the report of the Directors, who added that the accounts for the year 1916 might be considered as satisfactory, having regard to the restrictions prevailing. The working statement of the Engineer (Mr. Frank H. Robinson) shows that the gas sold in the year was 309 865,100 c.ft.; the total accounted for being 315,926,100 c.ft., and that unaccounted for 26,223,200 c.ft.

Gas Company's Carter and Military Service.—The Truro City Tribunal at its last sitting decided that a carter in the employ of the Gas Company, classed B 1, must join the Army on April 1. Mr. S. J. Ingram, the Manager of the Company, contended that the man was in a certified occupation (though he was not badged), and ought not to be taken from his present employment. The Mayor said the opinion of the tribunal was that the man would be better employed if he were serving with the Colours. With their local knowledge, they were agreed that a man driving a coal cart for the Gas Company could not possibly be held to be so important that he must be retained. Mr. Ingram said he differed from the tribunal, and should appeal.

Eastbourne Gas Company.—At the recent meeting of the Company, the Directors reported that the revenue account showed a profit for the half year ended Dec. 31 of £6542. A sum of £1197 had been transferred from the reserve fund to profit and loss account. They recommended the payment of dividends for the half year at the rate of £6 16s. 3d. p.ct. per annum upon the "A" stock, £5 6s. 3d. p.ct. per annum upon the "B" stock, and £5 p.ct. per annum upon the preference stock. The Directors added: "The increased cost of materials and other charges arising from the war have hitherto been largely met by drawing upon funds in hand. As will be seen, however, the balance at the credit of profit and loss is now exhausted, and the reserve funds considerably depleted. In these circumstances, the Directors will have no alternative but to further increase the charges for gas." It was pointed out by the Chairman (Mr. J. C. Towner) that every ton of coal coming to the works by sea *viâ* the Thames cost at least £1 per ton for freight.

A War Savings Association, with more than forty members, has been formed at the Oldbury Gas-Works.

The salary of Mr. George W. Fligg, Gas Manager to the Dewsbury County Borough Council, has been increased from £300 to £350 per annum.

The Liverpool business of oil importers carried on by Messrs. Meade-King, Robinson, and Co. was on the 23rd ult. converted into a limited liability company, with a capital of £100,000 in £1 shares.

Owing to the shortage of coal caused by the German interference with neutral shipping, the gas and electricity works at Cadiz will, says "The Times," close on the 12th inst., if no solution of the difficulty can be found.

At last Thursday's meeting of the Dewsbury Town Council, the salary of Mr. G. W. Fligg, the Gas-Works Engineer, was increased by £50 a year—an advance which the Chairman of the Gas and Water Committee (Alderman M'Cann) said was greatly overdue.

At the half-yearly meeting of the British Gaslight Company, Ltd., to be held later in the month, the Directors propose to recommend (subject to audit) a dividend at the rate of 10 p.ct. per annum, with a bonus of 2s. 6d. per share, for the half year ended Dec. 31, both less income-tax, and payable in April.

The annual meeting of the Richmond Gas Stove and Meter Company will be held on Thursday, at Warrington. The report for 1916 shows a balance to the credit of the profit and loss account, including the amount brought forward, of £34,943. After allowing for depreciation of £7421, and placing £5000 to the reserve fund, the Directors recommend a dividend of 12½ p.ct. on the ordinary shares.

Having regard to the effect of daylight saving, under which daylight continues until 9 and 10 o'clock during the summer months, the Lighting Committee of the Deptford Borough Council reports that they have considered whether it would not be desirable during May, June, July, and August to dispense with lighting the street lamps except at dangerous crossings. A considerable economy in fuel and labour could be effected if this plan were adopted. The Committee recommends that the point as to the desirability of thus abandoning the street lighting should be brought to the notice of the Commissioner of Police.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Manager. Troon Gas-Works. Applications by March 10.
Manager. Donington Gas Company. Applications by March 14.
Engineer's Estimating Department. No. 6285.
Works Foreman. Walsall Gas-Works. Applications by March 19.
Foreman (Meter Works). No. 6283.
Telpher Driver. Rochester, &c., Gas Company.
Stoking Machine Driver. Rochester, &c., Gas Company.
Stoker. Sidmouth Gas-Works.
Stoker. Halesowen Gas-Works.
Youth (Water Gas and Tar Dehydrating Plant). Aylesbury Gas Company.

Trading With the Enemy Act Sale.

British Incandescent Mantle Works. Tenders by March 19. Particulars and orders to view of Wheatley Kirk, Price, and Co., 46, Watling Street, E.C.

TENDERS FOR

Coal.
Plymouth Corporation Gas-Works. Tenders by March 17.

General Stores (Ironmongery, Oils, Paints Steel Goods, Castings, &c., &c.)
Brighouse Corporation. Tenders by March 16.

Mantles (seized by Customs).
Tenders by March 17 to the Secretary, Custom House, E.C.

Meters.
Brighouse Corporation. Tenders by March 16.

Pipes, &c.
Brighouse Corporation. Tenders by March 16.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

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